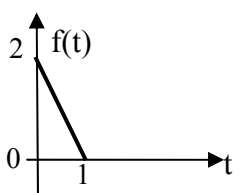
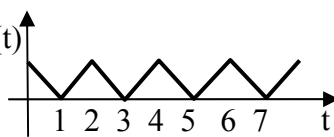
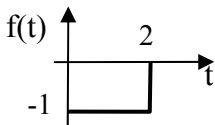
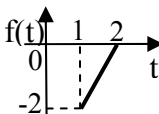
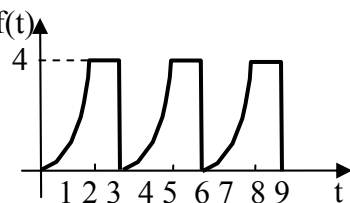


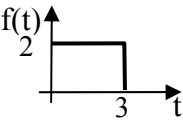
Вариант 16

| Условие                                                                                                    | Ответ                                                                                            |
|------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| 1. $f(t) = tg t^2$                                                                                         | 1. Нет                                                                                           |
| 2. $f(t) = t \cdot sh t$                                                                                   | 2. $F(p) = \frac{2p}{(p^2 - 1)^2}$                                                               |
| 3. $f(t) = e^{-2t} \cos 2t - e^{-2t} \sin 2t$                                                              | 3. $F(p) = \frac{p}{(p+2)^2 + 4}$                                                                |
| 4. $f(t) = \int_0^t t^4 e^{-3t} dt$                                                                        | 4. $F(p) = \frac{4!}{p(p+3)^5}$                                                                  |
| 5. $f(t) = \cos^2(t-4)\eta(t-4)$                                                                           | 5. $F(p) = \frac{(p^2 + 2)e^{-4p}}{2p(p^2 + 4)}$                                                 |
| 6. $f(t) = \int_0^t \tau^2 sh 3(t-\tau) d\tau$                                                             | 6. $F(p) = \frac{6}{p^3(p^2 - 9)}$                                                               |
| 7.                      | 7. $F(p) = \frac{2(p-1+e^{-p})}{p^2}$                                                            |
| 8. $f(t) = (t^2 - 8t + 7)\eta(t-7)$                                                                        | 8. $F(p) = \frac{2+6p}{p^3} e^{-7p}$                                                             |
| 9. $f(t) = (2t-1)sh(2t-1)\eta(t-\frac{1}{2})$                                                              | 9. $F(p) = \frac{8p}{(p^2 - 4)^2} e^{-\frac{p}{2}}$                                              |
| 10. $f(t) = \frac{\sin 2t \cdot \left[ \int_0^t \left( \int_0^\tau \eta(u) du \right) d\tau \right]}{t^3}$ | 10. $F(p) = \frac{1}{2} \left( \frac{\pi}{2} - \operatorname{arctg} \frac{p}{2} \right)$         |
| 11.                     | 11. $F(p) = \frac{1}{(1-e^{-2p})} \left( \frac{1-e^{-2p}}{p} - \frac{(1-e^{-p})^2}{p^2} \right)$ |

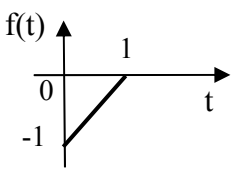
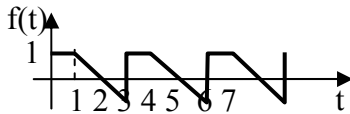
|                                                                                                                                                  |                                                                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12. $f(t) = (e^{\alpha t} e^{-\beta t} t^2 e^{-\gamma t})''$                                                                                     | 12. $F(p) = \frac{2p^2}{(p - \alpha + \beta + \gamma)^3}$                                                                                                                      |
| 13. $F(p) = \frac{p+2}{(p^2 - 4p + 4)(p^2 + 4)}$                                                                                                 | 13. $f(t) = \frac{1}{2}te^{2t} - \frac{1}{8}e^{2t} + \frac{1}{8}\cos 2t - \frac{1}{8}\sin 2t$                                                                                  |
| 14. $F(p) = \frac{d}{dp} \left( \frac{3(p+1)}{(p+1)^2 - 9} \right)$                                                                              | 14. $f(t) = -3te^{-t} \operatorname{ch} 3t$                                                                                                                                    |
| 15. $F(p) = \frac{5e^{-5p}}{(p+3)(p-4)^2}$                                                                                                       | 15. $f(t) = \left( \frac{5}{49}e^{-3(t-5)} + \frac{5}{7}(t-5)e^{4(t-5)} - \frac{5}{49}e^{4(t-5)} \right) \eta(t-5)$                                                            |
| 16. $y'' + y' - 2y = f(t)$ , где<br> $y(0) = 1$<br>$y'(0) = 1$ | 16. $y(t) = \frac{1}{2} - \frac{1}{6}e^{-2t} + \frac{2}{3}e^t - \frac{1}{2}\eta(t-2) + \frac{1}{6}e^{-2(t-2)}\eta(t-2) + \frac{1}{3}e^{t-2}\eta(t-2)$                          |
| 17. $x'' - x' - 6x = -2\operatorname{sh} 3t$<br>$x(0) = 0, \quad x'(0) = -2$                                                                     | 17. $x(t) = -\frac{t}{5}e^{3t} - \frac{49}{150}e^{3t} + \frac{1}{6}e^{-3t} + \frac{4}{25}e^{-2t}$                                                                              |
| 18. $x'' + 4x' + 3x = 2\sin 2t$<br>$x(0) = 0 \quad x'(0) = 0$                                                                                    | 18. $x(t) = \frac{2}{5}e^{-t} - \frac{16}{65}\cos 2t - \frac{2}{65}\sin 2t - \frac{2}{13}e^{-3t}$                                                                              |
| 19. $\begin{cases} x' + 3x + 3y = e^t \\ y' + 2y + 2x = e^{2t} \end{cases}$<br>$x(0) = y(0) = 0$                                                 | 19. $x(t) = -\frac{1}{10} - \frac{3}{14}e^{2t} + \frac{1}{2}e^t - \frac{13}{70}e^{-5t}$<br>$y(t) = \frac{1}{10} + \frac{5}{14}e^{2t} - \frac{1}{3}e^t - \frac{13}{105}e^{-5t}$ |
| 20. $x'' + x = \frac{1}{1 + \cos t}$<br>$x(0) = x'(0) = 0$                                                                                       | 20. $x(t) = t \sin t - 2 \sin^2 \frac{t}{2} + \cos t \cdot [\ln(1 + \cos t) - \ln 2]$                                                                                          |

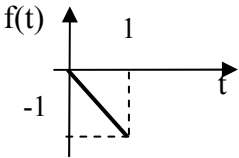
Вариант 17

| Условие                                                                                 | Ответ                                                                           |
|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| 1. $f(t) = e^{\sin t}$                                                                  | 1. Да                                                                           |
| 2. $f(t) = t \cdot \operatorname{ch} 3t$                                                | 2. $F(p) = \frac{p^2 + 9}{(p^2 - 9)^2}$                                         |
| 3. $f(t) = e^{-t} \cos 2t + e^{-t} \sin 2t$                                             | 3. $F(p) = \frac{p + 3}{(p + 1)^2 + 4}$                                         |
| 4. $f(t) = \int_0^t t^4 e^{4t} dt$                                                      | 4. $F(p) = \frac{4!}{p(p - 4)^5}$                                               |
| 5. $f(t) = \cos^2(t - 5)\eta(t - 5)$                                                    | 5. $F(p) = \frac{(p^2 + 2)}{p(p^2 + 4)} e^{-5p}$                                |
| 6. $f(t) = \int_0^t (t - \tau)^3 \operatorname{sh} 5\tau d\tau$                         | 6. $F(p) = \frac{30}{p^4(p^2 - 25)}$                                            |
| 7.   | 7. $F(p) = \frac{2(1 - p - e^{-p})}{p^2} e^{-p}$                                |
| 8. $f(t) = (\frac{t^2}{4} - 3t + 7)\eta(t - 8)$                                         | 8. $F(p) = e^{-8p} \left( \frac{1}{2p^3} + \frac{1}{p^2} - \frac{1}{p} \right)$ |
| 9. $f(t) = (2t - 2)^2 \operatorname{sh}(t - 1)\eta(t - 1)$                              | 9. $F(p) = 4e^{-p} \left( \frac{1}{(p - 1)^3} - \frac{1}{(p + 1)^3} \right)$    |
| 10. $f(t) = \int_0^t \frac{\sin 3t \cdot \sin 5t}{t} dt$                                | 10. $F(p) = \frac{1}{p} \ln 4 \sqrt{\frac{p^2 + 64}{p^2 + 4}}$                  |
| 11.  | 11. $F(p) = \frac{2 - 2e^{-2p} - 4pe^{-2p} - 4p^2e^{-3p}}{p^3(1 - e^{-3p})}$    |

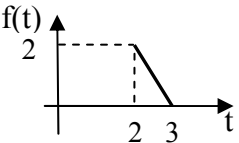
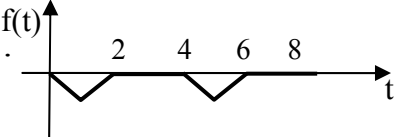
|                                                                                                                                                     |                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12. $f(t) = e^{2t} \int_0^t 2 \sin(t - \tau) \cdot \cos \tau d\tau$                                                                                 | 12. $F(p) = \frac{2(p-2)}{((p-2)^2 + 1)^2}$                                                                                                                               |
| 13. $F(p) = \frac{3p+2}{(p^2+4)(p^2+4p+4)}$                                                                                                         | 13. $f(t) = \frac{3}{8} \sin 2t - \frac{1}{8} \cos 2t -$<br>$-\frac{1}{2} t e^{-2t} + \frac{1}{8} e^{-2t}$                                                                |
| 14. $F(p) = \frac{d}{dp} \left( \frac{4(p-3)}{(p-3)^2 - 4} \right)$                                                                                 | 14. $f(t) = -4t e^{3t} \operatorname{ch} 2t$                                                                                                                              |
| 15. $F(p) = \frac{-5e^{-5p}}{(p-3)(p-4)^2}$                                                                                                         | 15. $f(t) = -5(e^{3(t-5)} + (t-5)e^{4(t-5)} -$<br>$-e^{4(t-5)})\eta(t-5)$                                                                                                 |
| 16. $y'' - 5y' - 6y = f(t)$ , где<br><br>$y(0) = 0$<br>$y'(0) = 0$ | 16. $y(t) = -\frac{1}{3} + \frac{1}{21} e^{6t} + \frac{2}{7} e^{-t} + \frac{1}{3} \eta(t-3) -$<br>$-\frac{1}{21} e^{6(t-3)} \eta(t-3) - \frac{2}{7} e^{-(t-3)} \eta(t-3)$ |
| 17. $x'' - 3x' - 4x = -3 \operatorname{sh} 4t$<br>$x(0) = 0, \quad x'(0) = -1$                                                                      | 17. $x(t) = \frac{1}{25} e^{-t} + \frac{1}{16} e^{-4t} - \frac{(120t+41)e^{4t}}{400}$                                                                                     |
| 18. $x'' + x' - 2x = 3 \sin 3t$<br>$x(0) = 0 \quad x'(0) = 0$                                                                                       | 18. $x(t) = -\frac{9}{130} \cos 3t - \frac{33}{130} \sin 3t -$<br>$-\frac{3}{13} e^{-2t} + \frac{3}{10} e^t$                                                              |
| 19. $\begin{cases} x' + 3x + 3y = e^{-t} \\ y' - y - x = 3e^{-t} \end{cases}$<br>$x(0) = y(0) = 0$                                                  | 19. $x(t) = -5 - 6e^{-2t} + 11e^{-t}$<br>$y(t) = 5 + 2e^{-2t} - 7e^{-t}$                                                                                                  |
| 20. $x'' + 4x = \frac{1}{1 + \cos 2t}$<br>$x(0) = x'(0) = 0$                                                                                        | 20. $x(t) = \frac{1}{2} t \sin t - \frac{1}{2} \sin^2 t +$<br>$+\frac{1}{4} \cos 2t \cdot \ln(1 + \cos 2t) - \frac{\cos 2t}{4} \ln 2$                                     |

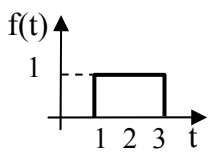
Вариант 18

| Условие                                                                                 | Ответ                                                                                                                                                   |
|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. $f(t) = \frac{1}{2t^2}$                                                              | 1. Нет                                                                                                                                                  |
| 2. $f(t) = 2t \cdot \operatorname{ch} 5t$                                               | 2. $F(p) = \frac{2(p^2 + 25)}{(p^2 - 25)^2}$                                                                                                            |
| 3. $f(t) = e^t \sin 2t - 2e^t \cos 2t$                                                  | 3. $F(p) = \frac{4 - 2p}{(p - 1)^2 + 4}$                                                                                                                |
| 4. $f(t) = \int_0^t t^4 e^{-5t} dt$                                                     | 4. $F(p) = \frac{4!}{p(p + 5)^5}$                                                                                                                       |
| 5. $f(t) = \sin^2(t - 4)\eta(t - 4)$                                                    | 5. $F(p) = \frac{2e^{-4p}}{p(p^2 + 4)}$                                                                                                                 |
| 6. $f(t) = \int_0^t \tau^4 \operatorname{sh} 7(t - \tau) d\tau$                         | 6. $F(p) = \frac{168}{p^5(p^2 - 49)}$                                                                                                                   |
| 7.   | 7. $F(p) = \frac{1 - p - e^{-p}}{p^2}$                                                                                                                  |
| 8. $f(t) = (t^2 - 11t + 20)\eta(t - 9)$                                                 | 8. $F(p) = \frac{e^{-9p}}{p^3} (2 + 7p + 2p^2)$                                                                                                         |
| 9. $f(t) = \sin 2(t - 1)e^{-(t-1)}\eta(t - 1)$                                          | 9. $F(p) = \frac{2e^{-p}}{(p + 1)^2 + 4}$                                                                                                               |
| 10. $f(t) = \frac{2}{t} \int_0^t (\cos \omega t - \cos kt) di$                          | 10. $F(p) = \frac{\pi}{\omega} - \frac{\pi}{k} - \frac{2}{\omega} \operatorname{arctg} \frac{p}{\omega} + \frac{2}{k} \operatorname{arctg} \frac{p}{k}$ |
| 11.  | 11. $F(p) = \frac{1}{p^2} (p + pe^{-3p} + e^{-3p} - e^{-p})$                                                                                            |

|                                                                                                                                                 |                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12. $f(t) = 2(\sin t \cdot e^t - \sin t e^{-t})'$                                                                                               | 12. $F(p) = \frac{8p^2}{((p-2)^2 + 1)((p+1)^2 + 1)}$                                                                                                                                                                                         |
| 13. $F(p) = \frac{8p+2}{p^2(p^2+4)}$                                                                                                            | 13. $f(t) = 2 + \frac{1}{2}t - 2\cos 2t - \frac{1}{4}\sin 2t$                                                                                                                                                                                |
| 14. $F(p) = \frac{d}{dp} \left( \frac{5(p+3)}{(p+3)^2 - 1} \right)$                                                                             | 14. $f(t) = -5te^{-3t} \operatorname{cht}$                                                                                                                                                                                                   |
| 15. $F(p) = \frac{6e^{-6p}}{(p+2)(p-4)^2}$                                                                                                      | 15. $f(t) = \left( \frac{1}{6}e^{-2(t-6)} - \frac{1}{6}e^{4(t-6)} + \right.$<br>$\left. + (t-6)e^{4(t-6)} \right) \eta(t-6)$                                                                                                                 |
| 16. $y'' + 10y' + 25y = f(t)$ , где<br><br>$y(0) = y'(0) = 0$ | $y(t) = \frac{2}{125} - \frac{1}{25}t - \frac{2}{125}e^{-5t} - \frac{1}{25}te^{-5t} +$<br>16. $+\frac{3}{125}\eta(t-1) + \frac{1}{25}(t-1)\eta(t-1) -$<br>$-\frac{3}{125}e^{-5(t-1)}\eta(t-1) -$<br>$-\frac{4}{25}(t-1)e^{-5(t-1)}\eta(t-1)$ |
| 17. $x'' + 3x' - 4x = 2sh t$<br>$x(0) = 0, \quad x'(0) = 2$                                                                                     | 17. $x(t) = \frac{1}{5}te^t + \frac{1}{6}e^{-t} + \frac{13}{50}e^t - \frac{32}{75}e^{-4t}$                                                                                                                                                   |
| 18. $x'' + 4x' = 20 \sin 3t$<br>$x(0) = 0 \quad x'(0) = 0$                                                                                      | 18. $x(t) = \frac{5}{3} - \frac{3}{5}e^{-4t} - \frac{4}{5}\sin 3t - \frac{16}{15}\cos 3t$                                                                                                                                                    |
| 19. $\begin{cases} x' - 3x - 3y = 3e^{3t} \\ y' - y - x = e^{2t} \end{cases}$<br>$x(0) = y(0) = 0$                                              | 19. $x(t) = \frac{1}{8} - \frac{3}{4}e^{2t} - 2e^{3t} + \frac{21}{8}e^{4t}$<br>$y(t) = -\frac{1}{8} + \frac{1}{4}e^{2t} - e^{3t} + \frac{7}{8}e^{4t}$                                                                                        |
| 20. $x'' - 2x' = \frac{1}{1+e^{2t}}$<br>$x(0) = x'(0) = 0$                                                                                      | 20. $x(t) = -\frac{1}{2}\ln 2 + \frac{e^{2t}}{4}\ln(1+e^{2t}) -$<br>$-\frac{te^{2t}}{2} - \frac{t}{2} + \frac{1}{4}\ln(1+e^{2t})$                                                                                                            |

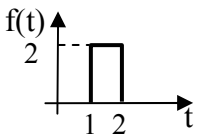
Вариант 19

| УСЛОВИЕ                                                                                 | ОТВЕТ                                                                                                              |
|-----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| 1. $f(t) = t \cdot ctgt$                                                                | 1. Нет                                                                                                             |
| 2. $f(t) = 3e^t sh^2 t$                                                                 | 2. $F(p) = \frac{3}{2} \frac{p-1}{(p-1)^2 - 4} - \frac{3}{2(p-1)}$                                                 |
| 3. $f(t) = e^{-2t} \sin t + e^{-2t} \cos t$                                             | 3. $F(p) = \frac{p+3}{(p+2)^2 + 1}$                                                                                |
| 4. $f(t) = \int_0^t t \cos t \, dt$                                                     | 4. $F(p) = \frac{p^2 - 1}{p(p^2 + 1)^2}$                                                                           |
| 5. $f(t) = \cos 7(t-8)e^{t-8}\eta(t-8)$                                                 | 5. $F(p) = \frac{(p-1)e^{-8p}}{(p-1)^2 + 49}$                                                                      |
| 6. $f(t) = \int_0^t (t-\tau)^5 \sin 2\tau \, d\tau$                                     | 6. $F(p) = \frac{240}{p^6(p^2 + 4)}$                                                                               |
| 7.   | 7. $F(p) = \frac{2e^{-2p}}{p^2}(p-1+e^{-p})$                                                                       |
| 8. $f(t) = (t^2 - 6t + 5)\eta(t-1)$                                                     | 8. $F(p) = \frac{2e^{-p}}{p^3} - \frac{4e^{-p}}{p^2}$                                                              |
| 9. $f(t) = 2sh(3t-5) \cdot ch(3t-5)\eta(t-\frac{5}{3})$                                 | 9. $F(p) = \frac{6e^{-\frac{5}{3}p}}{p^2 - 36}$                                                                    |
| 10. $f(t) = \int_0^t \frac{sh t - \sin t}{t} dt$                                        | 10. $F(p) = \frac{1}{p} \operatorname{arctg} p - \frac{\pi}{2p} - \frac{1}{2p} \ln \left  \frac{p-1}{p+1} \right $ |
| 11.  | 11. $F(p) = \frac{2e^{-p} - 1 - e^{-2p}}{p^2(1 - e^{-4p})}$                                                        |

|                                                                                                                                                   |                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12. $f(t) = -t(te^{-9t})'$                                                                                                                        | 12. $F(p) = \frac{9-p}{(p+9)^3}$                                                                                                                                                                  |
| 13. $F(p) = \frac{2p^2 - 5}{(p+3)^2(p^2 + 4)}$                                                                                                    | 13. $f(t) = \frac{6}{13}e^{-3t} + te^{-3t} + \frac{6}{13}\cos 2t - \frac{5}{26}\sin 2t$                                                                                                           |
| 14. $F(p) = \frac{d}{dp} \left( \frac{8}{(p-1)^2 - 16} \right)$                                                                                   | 14. $f(t) = -2te^t \operatorname{sh} 4t$                                                                                                                                                          |
| 15. $F(p) = \frac{4e^{-4p}}{(p-2)(p+1)^2}$                                                                                                        | 15. $f(t) = \frac{4}{9}(e^{2(t-4)} - e^{-(t-4)} - 3(t-4)e^{-(t-4)})\eta(t-4)$                                                                                                                     |
| 16. $y'' + y' - 12y = f(t)$ , где<br> $y(0) = 0$<br>$y'(0) = 0$ | 16. $y(t) = \left[ -\frac{1}{12} + \frac{1}{21}e^{3(t-1)} + \frac{1}{28}e^{-4(t-1)} \right] \eta(t-1) + \left[ \frac{1}{12} - \frac{1}{21}e^{3(t-3)} - \frac{1}{28}e^{-4(t-3)} \right] \eta(t-3)$ |
| 17. $x'' + x' - 6x = -\operatorname{sh} 2t$ ,<br>$x(0) = 0, x'(0) = -1$                                                                           | 17. $x(t) = \frac{7}{25}e^{-3t} - \frac{1}{8}e^{-2t} - \frac{31}{200}e^{2t} - \frac{1}{10}te^{2t}$                                                                                                |
| 18. $x'' - x' - 2x = 12 \sin 2t$<br>$x(0) = 0, x'(0) = 0$                                                                                         | 18. $x(t) = e^{2t} - \frac{8}{5}e^{-t} - \frac{9}{5}\sin 2t + \frac{3}{5}\cos 2t$                                                                                                                 |
| 19. $\begin{cases} x' - 3x - 3y = 2e^{3t} \\ y' - 2y - 2x = 2e^t \end{cases}$<br>$x(0) = 0, y(0) = 0$                                             | 19. $x(t) = \frac{14}{15} - \frac{3}{2}e^t - \frac{1}{3}e^{3t} + \frac{9}{10}e^{5t}$ ,<br>$y(t) = -\frac{14}{15} + e^t - \frac{2}{3}e^{3t} + \frac{3}{5}e^{5t}$                                   |
| 20. $x'' - 3x' = \frac{1}{1+e^{-3t}}$<br>$x(0) = x'(0) = 0$                                                                                       | 20. $x(t) = \frac{e^{3t}}{9} \ln 2 - \frac{1}{9} \ln(e^{-3t} + 1) + \frac{\ln 2}{9} - \frac{e^{3t}}{9} \ln(1 + e^{-3t}) - \frac{t}{3}$                                                            |

Вариант 20

| Условие                                                            | Ответ                                                                                                 |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| 1. $f(t) = \int_0^t t \operatorname{sh} t \, dt$                   | 1. Да                                                                                                 |
| 2. $f(t) = 2e^{-t} \sin 3t$                                        | 2. $F(p) = \frac{6}{(p+1)^2 + 9}$                                                                     |
| 3. $f(t) = e^{-2t} \sin 5t - e^{-2t} \cos 5t$                      | 3. $F(p) = \frac{3-p}{(p+2)^2 + 25}$                                                                  |
| 4. $f(t) = \int_0^t t \operatorname{ch} 2t \, dt$                  | 4. $F(p) = \frac{p^2 + 4}{p(p^2 - 4)^2}$                                                              |
| 5. $f(t) = \sin 5(t-2)\eta(t-2)$                                   | 5. $F(p) = \frac{5e^{-2p}}{p^2 + 25}$                                                                 |
| 6. $f(t) = \int_0^t \tau^5 \operatorname{ch} 2(t-\tau) \, d\tau$   | 6. $F(p) = \frac{5!}{p^6(p^2 - 4)}$                                                                   |
| 7.                                                                 | 7. $F(p) = \frac{e^{-\frac{\pi}{2}p} - pe^{-\pi p}}{p^2 + 1}$                                         |
| 8. $f(t) = (\frac{t^2}{2} - 2t + 3)\eta(t-2)$                      | 8. $F(p) = \frac{e^{-2p}}{p^3} + \frac{e^{-2p}}{p}$                                                   |
| 9. $f(t) = \operatorname{sh}(2t-7)e^{-2t+7}\eta(t-\frac{7}{2})$    | 9. $F(p) = \frac{2e^{-\frac{7}{2}p}}{(p+2)^2 - 4}$                                                    |
| 10. $f(t) = \int_0^t \frac{e^{-\lambda t} \sin \omega t}{t} \, dt$ | 10. $F(p) = \frac{1}{p} \left[ \frac{\pi}{2} - \operatorname{arctg} \frac{p+\lambda}{\omega} \right]$ |
| 11.                                                                | 11. $F(p) = \frac{2e^{-2p} - e^{-3p} - e^{-p}}{p^2(1 - e^{-3p})}$                                     |

|                                                                                                                                                   |                                                                                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12. $f(t) = t(te^{2t})'$                                                                                                                          | 12. $F(p) = \frac{2+p}{(p-2)^3}$                                                                                                                                                              |
| 13. $F(p) = \frac{p^2 + 5}{p^2(p^2 + 25)}$                                                                                                        | 13. $f(t) = \frac{1}{5}t + \frac{4}{25}\sin 5t$                                                                                                                                               |
| 14. $F(p) = \frac{d}{dp} \left( \frac{9}{(p+1)^2 - 9} \right)$                                                                                    | 14. $f(t) = -3te^{-t} \operatorname{sh} 3t$                                                                                                                                                   |
| 15. $F(p) = \frac{e^{-p}}{(p+5)(p-3)^2}$                                                                                                          | 15. $f(t) = \frac{1}{64}(e^{-5(t-1)} - e^{3(t-1)} + 8(t-1)e^{3(t-1)})\eta(t-1)$                                                                                                               |
| 16. $y'' + 3y' - 10y = f(t)$ , где<br> $y(0) = 0$<br>$y'(0) = 0$ | 16. $y(t) = \left[ -\frac{1}{5} + \frac{1}{7}e^{2(t-1)} + \frac{2}{35}e^{-5(t-1)} \right] \eta(t-1) + \left[ \frac{1}{5} - \frac{1}{7}e^{2(t-2)} - \frac{2}{35}e^{-5(t-2)} \right] \eta(t-2)$ |
| 17. $x'' - x' - 6x = 2\operatorname{sh} 3t$ ,<br>$x(0) = 0, x'(0) = 1$                                                                            | 17. $x(t) = \frac{1}{25}e^{-2t} - \frac{1}{6}e^{-3t} + \frac{1}{5}te^{3t} + \frac{19}{150}e^{3t}$                                                                                             |
| 18. $x'' - 3x' + 2x = 10\sin t$<br>$x(0) = 0, x'(0) = 0$                                                                                          | 18. $x(t) = 2e^{2t} - 5e^t + \sin t + 3\cos t$                                                                                                                                                |
| 19. $\begin{cases} x' - 3x - 3y = 2e^{-2t} \\ y' + 2y + 2x = e^{-t} \end{cases}$<br>$x(0) = 0, y(0) = 0$                                          | 19. $x(t) = -5 + \frac{3}{2}e^{-t} + \frac{7}{2}e^t$ ,<br>$y(t) = 5 - 2e^{-t} - \frac{2}{3}e^{-2t} - \frac{7}{3}e^t$                                                                          |
| 20. $x''' = \frac{1}{1+t^2} + 2t$<br>$x(0) = x'(0) = x''(0) = 0$                                                                                  | 20. $x(t) = \frac{t^2}{2} \operatorname{arctg} t - \frac{1}{2}t \ln(1+t^2) + \frac{t}{2} - \frac{1}{2} \operatorname{arctg} t + \frac{t^4}{12}$                                               |