

Задача № 3. Найти векторные линии в векторном поле  $\bar{a}$ .

$n/n$	$\bar{a}$	Ответ
3.1	$\bar{a} = 4y\bar{i} - 9xz\bar{j}$	$\begin{cases} 9xz^2 + 4y^2 = 2c \\ z = c \end{cases}$
3.2	$\bar{a} = 2y\bar{i} + 3xz\bar{j}$	$\begin{cases} z = c, \frac{3}{2}x^2 - y^2 = c \end{cases}$
3.3	$\bar{a} = 2xz\bar{i} + 4y\bar{j}$	$\begin{cases} z = c \\ y = x^2 c \end{cases}$
3.4	$\bar{a} = x\bar{i} + 3y\bar{j}$	$\begin{cases} z = c \\ y = x^3 c \end{cases}$
3.5	$\bar{a} = x\bar{i} + 4y\bar{j}$	$\begin{cases} z = c \\ y = x^4 c \end{cases}$
3.6	$\bar{a} = 3xz\bar{i} + 6z\bar{k}$	$\begin{cases} y = c \\ z = x^2 c \end{cases}$
3.7	$\bar{a} = 4z\bar{i} - 9xz\bar{k}$	$\begin{cases} y = c \\ \frac{9}{2}x^2 + 2z^2 = c \end{cases}$
3.8	$\bar{a} = 2z\bar{i} + 3xz\bar{k}$	$\begin{cases} y = c \\ 3xz^2 - 2z^2 = c \end{cases}$
3.9	$\bar{a} = 4y\bar{j} + 8z\bar{k}$	$\begin{cases} x = c \\ z = y^2 c \end{cases}$
3.10	$\bar{a} = y\bar{j} + 3z\bar{k}$	$\begin{cases} z = y^3 c, x = c \end{cases}$
3.11	$\bar{a} = 2x\bar{i} + 8z\bar{k}$	$\begin{cases} y = c \\ z = x^4 c \end{cases}$
3.12	$\bar{a} = x\bar{i} + 3z\bar{k}$	$\begin{cases} y = c \\ z = x^3 c \end{cases}$
3.13	$\bar{a} = 4z\bar{j} - 9y\bar{k}$	$\begin{cases} x = c \\ 2z^2 + \frac{9}{2}y^2 = c \end{cases}$
3.14	$\bar{a} = 2z\bar{j} + 3y\bar{k}$	$\begin{cases} x = c \\ \frac{3}{2}y^2 - z^2 = c \end{cases}$
3.15	$\bar{a} = 5x\bar{i} + 10y\bar{j}$	$\begin{cases} z = c \\ y = x^2 c \end{cases}$
3.16	$\bar{a} = 2x\bar{i} + 6y\bar{j}$	$\begin{cases} x = y^3 \\ z = 0 \end{cases}$
3.17	$\bar{a} = y\bar{j} + 4z\bar{k}$	$\begin{cases} y^4 = z^2 c \\ x = c \end{cases}$
3.18	$\bar{a} = x\bar{i} + y\bar{j}$	$\begin{cases} y = x^2 c \\ z = c \end{cases}$
3.19	$\bar{a} = 9y\bar{i} - 4xz\bar{j}$	$\begin{cases} 9y^2 + 4xz^2 = c \\ z = c \end{cases}$
3.20	$\bar{a} = 5y\bar{i} + 7xz\bar{j}$	$\begin{cases} 7xz^2 - 5y^2 = c \\ z = c \end{cases}$
3.21	$\bar{a} = 6xz\bar{i} + 12z\bar{k}$	$\begin{cases} x^2 = z^2 c \\ z = c \end{cases}$
3.22	$\bar{a} = 2y\bar{j} + 6z\bar{k}$	$\begin{cases} y^3 = z^2 c \\ x = c \end{cases}$
3.23	$\bar{a} = 4xz\bar{i} + y\bar{j}$	$\begin{cases} x = y^4 c \\ z = c \end{cases}$
3.24	$\bar{a} = 9z\bar{i} - 4xz\bar{k}$	$\begin{cases} c = 2x^2 + \frac{9}{2}z^2 \\ y = c \end{cases}$
3.25	$\bar{a} = x\bar{i} + z\bar{k}$	$\begin{cases} x = z^2 c \\ y = c \end{cases}$

Задача № 4. Найти поток векторного поля  $\bar{a}$  через часть поверхности  $S$ , вырезаемую плоскостями  $P_1, P_2$  (нормаль внешняя к замкнутой поверхности, образуемой данными поверхностями).

$n/n$	$\bar{a}$	$P_1$	$P_2$	$S$	ответ
4.1	$\bar{a} = x\bar{i} + y\bar{j} + z\bar{k}$	$z=0$	$z=2$	$x^2 + y^2 = 1$	$4\pi$
4.2	$\bar{a} = x\bar{i} + y\bar{j} - z\bar{k}$	$z=0$	$z=4$	$x^2 + y^2 = 1$	$8\pi$
4.3	$\bar{a} = x\bar{i} + y\bar{j} + 2z\bar{k}$	$z=0$	$z=3$	$x^2 + y^2 = 1$	$6\pi$
4.4	$\bar{a} = x\bar{i} + y\bar{j} + z^3\bar{k}$	$z=0$	$z=1$	$x^2 + y^2 = 1$	$2\pi$
4.5	$\bar{a} = x\bar{i} + y\bar{j} + xy\bar{z}\bar{k}$	$z=0$	$z=5$	$x^2 + y^2 = 1$	$10\pi$
4.6	$\bar{a} = (x-y)\bar{i} + (x+y)\bar{j} + z^2\bar{k}$	$z=0$	$z=2$	$x^2 + y^2 = 1$	$4\pi$
4.7	$\bar{a} = (x+y)\bar{i} - (x-y)\bar{j} + xy\bar{z}\bar{k}$	$z=0$	$z=4$	$x^2 + y^2 = 1$	$8\pi$
4.8	$\bar{a} = (x^2 + 2xy^2)\bar{i} + (y^3 + 2x^2y)\bar{j} + xy\bar{z}\bar{k}$	$z=0$	$z=3$	$x^2 + y^2 = 1$	$6\pi$
4.9	$\bar{a} = x\bar{i} + y\bar{j} + \sin z\bar{k}$	$z=0$	$z=5$	$x^2 + y^2 = 1$	$10\pi$
4.10	$\bar{a} = x\bar{i} + y\bar{j} + z\bar{k}$	$z=0$	$z=1$	$x^2 + y^2 = 1$	$2\pi$

Задача № 4. Найти поток векторного поля  $\bar{a}$  через часть поверхности  $S$ , вырезаемую плоскостью  $P$  (нормаль внешняя к замкнутой поверхности, образуемой данными поверхностями).

$n/n$	$\bar{a}$	$S$	$P$	ответ
4.11	$\bar{a} = (x+xy^2)\bar{i} + (y-yx^2)\bar{j} + (x-z)\bar{k}$	$x^2 + y^2 = z^2 (z \geq 0)$	$z=1$	$2\pi R$
4.12	$\bar{a} = y\bar{i} - xy\bar{j} + \bar{k}$	$x^2 + y^2 = z^2 (z \geq 0)$	$z=4$	$-\frac{128\pi}{3}$
4.13	$\bar{a} = xy\bar{i} - x^2\bar{j} + 3\bar{k}$	$x^2 + y^2 = z^2 (z \geq 0)$	$z=1$	$-2\pi R$
4.14	$\bar{a} = xz\bar{i} + yz\bar{j} + (z^2 - 1)\bar{k}$	$x^2 + y^2 = z^2 (z \geq 0)$	$z=4$	$\frac{128\pi}{3}$
4.15	$\bar{a} = y^2x\bar{i} - yx^2\bar{j} + \bar{k}$	$x^2 + y^2 = z^2 (z \geq 0)$	$z=5$	$-\frac{250\pi}{3}$
4.16	$\bar{a} = (xz+y)\bar{i} + (yz-x)\bar{j} + (z^2 - 2)\bar{k}$	$x^2 + y^2 = z^2 (z \geq 0)$	$z=3$	$36\pi$
4.17	$\bar{a} = xyz\bar{i} - x^2z\bar{j} + 3\bar{k}$	$x^2 + y^2 = z^2 (z \geq 0)$	$z=2$	$-16\pi$
4.18	$\bar{a} = (xe+xy)\bar{i} + (y-xe^2)\bar{j} + (z-1)\bar{k}$	$xe + y^2 = z^2 (z \geq 0)$	$z=3$	$18\pi$
4.19	$\bar{a} = (x+y)\bar{i} + (y-x)\bar{j} + (z-2)\bar{k}$	$xe + y^2 = z^2 (z \geq 0)$	$z=2$	$\frac{32\pi}{3}$
4.20	$\bar{a} = xe\bar{i} + y\bar{j} + (z-z)\bar{k}$	$xe^2 + y^2 = z^2 (z \geq 0)$	$z=1$	$\frac{4}{3}\pi$
4.21	$\bar{a} = (x+xez)\bar{i} + y\bar{j} + (z-xe^2)\bar{k}$	$xe^2 + y^2 + z^2 = 4 (z \geq 0)$	$z=0$	$16\pi$
4.22	$\bar{a} = xe\bar{i} + (y+yz^2)\bar{j} + (z-z^2)\bar{k}$	$xe^2 + y^2 + z^2 = 4 (z \geq 0)$	$z=0$	$16\pi$
4.23	$\bar{a} = (x+z)\bar{i} + (y+z)\bar{j} + (z-x-y)\bar{k}$	$xe^2 + y^2 + z^2 = 4 (z \geq 0)$	$z=0$	$16\pi$
4.24	$\bar{a} = (xe+xy)\bar{i} + (y-xe^2)\bar{j} + z\bar{k}$	$xe^2 + y^2 + z^2 = 1 (z \geq 0)$	$z=0$	$\pi$
4.25	$\bar{a} = (x+z)\bar{i} + y\bar{j} + (z-x)\bar{k}$	$xe^2 + y^2 + z^2 = 1 (z \geq 0)$	$z=0$	$\pi$

Задача № 5. Найти поток векторного поля  $\bar{a}$  через часть плоскости  $P$ , расположенную в первом октанте (нормаль образует острый угол с осью  $OZ$ ).

$n/n$	$\bar{a}$	$P$	ответ
5.1	$\bar{a} = xe\bar{i} + y\bar{j} + z\bar{k}$	$x+y+z=1$	$\frac{1}{2}$
5.2	$\bar{a} = y\bar{j} + z\bar{k}$	$x+y+z=1$	$\frac{1}{3}$
5.3	$\bar{a} = 2xe\bar{i} + y\bar{j} + z\bar{k}$	$xe+y+z=1$	$\frac{2}{3}$
5.4	$\bar{a} = xe\bar{i} + 3y\bar{j} + z\bar{k}$	$xe+y+z=1$	$1$
5.5	$\bar{a} = 2xe\bar{i} + 3y\bar{j}$	$xe+y+z=1$	$\frac{5}{6}$
5.6	$\bar{a} = xe\bar{i} + y\bar{j} + 2z\bar{k}$	$\frac{x}{2} + y + z = 1$	$1$
5.7	$\bar{a} = xe\bar{i} + 2y\bar{j} + z\bar{k}$	$\frac{x}{2} + y + z = 1$	$\frac{4}{3}$
5.8	$\bar{a} = y\bar{j} + 3z\bar{k}$	$\frac{x}{2} + y + z = 1$	$\frac{4}{3}$
5.9	$\bar{a} = xe\bar{i} + y\bar{j} + 2z\bar{k}$	$xe + \frac{y}{2} + \frac{z}{3} = 1$	$6$
5.10	$\bar{a} = 2xe\bar{i} + y\bar{j} + 2z\bar{k}$	$xe + \frac{y}{2} + \frac{z}{3} = 1$	$8$
5.11	$\bar{a} = 3xe\bar{i} + 2z\bar{k}$	$xe + \frac{y}{2} + \frac{z}{3} = 1$	$8$
5.12	$\bar{a} = 2xe\bar{i} + 3y\bar{j} + z\bar{k}$	$\frac{x}{3} + y + \frac{z}{2} = 1$	$6$
5.13	$\bar{a} = xe\bar{i} + 3y\bar{j} - z\bar{k}$	$\frac{x}{3} + y + \frac{z}{2} = 1$	$3$
5.14	$\bar{a} = -2xe\bar{i} + y\bar{j} + 4z\bar{k}$	$\frac{x}{3} + y + \frac{z}{2} = 1$	$5$
5.15	$\bar{a} = xe\bar{i} - y\bar{j} + 6z\bar{k}$	$\frac{x}{2} + \frac{y}{3} + z = 1$	$6$
5.16	$\bar{a} = 2xe\bar{i} + 5y\bar{j} + 5z\bar{k}$	$\frac{x}{2} + \frac{y}{3} + z = 1$	$12$
5.17	$\bar{a} = xe\bar{i} + y\bar{j} + z\bar{k}$	$2xe + \frac{y}{2} + z = 1$	$\frac{1}{2}$
5.18	$\bar{a} = 2xe\bar{i} + y\bar{j} - 2z\bar{k}$	$2xe + \frac{y}{2} + z = 1$	$\frac{1}{6}$
5.19	$\bar{a} = xe\bar{i} + y\bar{j} + 2z\bar{k}$	$2xe + \frac{y}{2} + z = 1$	$\frac{2}{3}$
5.20	$\bar{a} = -xe\bar{i} + y\bar{j} + 12z\bar{k}$	$2xe + \frac{y}{2} + z = 1$	$2$
5.21	$\bar{a} = xe\bar{i} + 3y\bar{j} + 8z\bar{k}$	$xe + 2y + \frac{z}{2} = 1$	$\frac{1}{21} \frac{9}{2}$
5.22	$\bar{a} = xe\bar{i} - y\bar{j} + 6z\bar{k}$	$xe + 2y + \frac{z}{2} = 1$	$1$
5.23	$\bar{a} = xe\bar{i} + 2y\bar{j} + 5z\bar{k}$	$xe + 2y + \frac{z}{2} = 1$	$\frac{4}{3}$
5.24	$\bar{a} = xe\bar{i} + 4y\bar{j} + 5z\bar{k}$	$xe + 2y + \frac{z}{2} = 1$	$\frac{5}{3}$
5.25	$\bar{a} = xe\bar{i} + y\bar{j} + z\bar{k}$	$2xe + 3y + z = 1$	$\frac{1}{12}$

Задача № 6. Найти поток векторного поля  $\bar{a}$  через часть плоскости  $P$ , расположенную в I-октанте (нормаль образует острый угол с осью  $OZ$ ).

$n/n$	$\bar{a}$	$P$	Ответ
6.1	$\bar{a} = \pi x\bar{i} + (5\pi y + 2)\bar{j} + 4\pi z\bar{k}$	$x + \frac{y}{2} + 4z = 1$	$\frac{11\pi}{3} + \frac{5}{6}$
6.2	$\bar{a} = 2\pi x\bar{i} + (7y + 2)\bar{j} + 7\pi z\bar{k}$	$x + \frac{y}{2} + \frac{z}{3} = 1$	$9\pi + 10$
6.3	$\bar{a} = 9\pi x\bar{i} + \bar{j} - 32\bar{k}$	$\frac{x}{5} + y + z = 1$	$\frac{9\pi}{2}$
6.4	$\bar{a} = (2x + 1)\bar{i} - y\bar{j} + 3\pi z\bar{k}$	$\frac{x}{3} + y + 2z = 1$	$\frac{3\pi}{4} + \frac{1}{2}$
6.5	$\bar{a} = 7x\bar{i} + \pi y\bar{j} + \bar{k}$	$x + \frac{y}{3} + z = 1$	$10 - \frac{9}{2}\pi$
6.6	$\bar{a} = \bar{i} + 5y\bar{j} + 11\pi z\bar{k}$	$x + y + \frac{z}{3} = 1$	$\frac{11}{2}\pi + \frac{11}{3}$
6.7	$\bar{a} = x\bar{i} + (\pi z - 1)\bar{k}$	$2x + \frac{y}{2} + \frac{z}{3} = 1$	$\pi/2$
6.8	$\bar{a} = 5\pi x\bar{i} + (9y + 1)\bar{j} + 4\pi z\bar{k}$	$\frac{x}{2} + \frac{y}{3} + \frac{z}{2} = 1$	$18\pi + 20$
6.9	$\bar{a} = 2i - y\bar{j} + \frac{3\pi}{2}z\bar{k}$	$\frac{x}{3} + y + \frac{z}{4} = 1$	$2\pi + 3$
6.10	$\bar{a} = 9\pi x\bar{i} + (5y + 1)\bar{j} + 2\pi z\bar{k}$	$3x + y + \frac{z}{9} = 1$	$\frac{11}{2}\pi + 4$
6.11	$\bar{a} = 7\pi x\bar{i} + 2\pi y\bar{j} + (7z + 2)\bar{k}$	$x + y + \frac{z}{2} = 1$	$3\pi + \frac{10}{3}$
6.12	$\bar{a} = \pi y\bar{j} + (4 - 2z)\bar{k}$	$2x + \frac{y}{3} + \frac{z}{4} = 1$	$\pi/1$
6.13	$\bar{a} = (3\pi - 1)x\bar{i} + (9\pi y + 1)\bar{j} + 6\pi z\bar{k}$	$\frac{x}{2} + \frac{y}{3} + \frac{z}{6} = 1$	$81\pi + 9$
6.14	$\bar{a} = \pi x\bar{i} + \frac{\pi}{2}y\bar{j} + (4 - 2z)\bar{k}$	$x + \frac{y}{3} + \frac{z}{4} = 1$	$3\pi - 2$
6.15	$\bar{a} = (5y + 3)\bar{j} + 11\pi z\bar{k}$	$x + \frac{y}{3} + 4z = 1$	$\frac{11\pi}{8} + 1$
6.16	$\bar{a} = 9\pi y\bar{j} + (7z + 1)\bar{k}$	$x + y + z = 1$	$\frac{27\pi}{2} + \frac{2}{3}$
6.17	$\bar{a} = \pi y\bar{j} + (1 - 2z)\bar{k}$	$\frac{x}{2} + \frac{y}{3} + z = 1$	$2\pi + 2$
6.18	$\bar{a} = (27\pi - 1)x\bar{i} + (34\pi y + 3)\bar{j} + 20\pi z\bar{k}$	$3x + \frac{y}{9} + z = 1$	$\frac{81\pi}{2} - \frac{1}{2}$
6.19	$\bar{a} = \pi x\bar{i} + 2\bar{j} + 2\pi z\bar{k}$	$\frac{x}{2} + \frac{y}{3} + z = 1$	$\frac{10\pi}{3} + 2$
6.20	$\bar{a} = 4\pi x\bar{i} + 7\pi y\bar{j} + (2z + 1)\bar{k}$	$2x + \frac{y}{3} + 2z = 1$	$\frac{11\pi}{8} + \frac{1}{4}$
6.21	$\bar{a} = 3\pi x\bar{i} + 6\pi y\bar{j} + 10\bar{k}$	$2x + y + \frac{z}{3} = 1$	$3\pi + \frac{5}{2}$
6.22	$\bar{a} = \pi x\bar{i} - 2y\bar{j} + \bar{k}$	$2x + \frac{y}{6} + z = 1$	$\pi + 1/2$
6.23	$\bar{a} = (21\pi - 1)x\bar{i} + 62\pi y\bar{j} + (7 - 2\pi z)\bar{k}$	$8x + \frac{y}{2} + \frac{z}{3} = 1$	$41\pi/4$
6.24	$\bar{a} = \pi x\bar{i} + 2\pi y\bar{j} + 2\bar{k}$	$\frac{x}{2} + \frac{y}{4} + \frac{z}{3} = 1$	$8 + \frac{76}{9}\pi$
6.25	$\bar{a} = 9\pi x\bar{i} + 2\pi y\bar{j} + 8\bar{k}$	$2x + \frac{y}{6} + z = 1$	$\frac{11}{16} + \frac{17}{32}$

10

Задача № 7. Найти поток векторного поля  $\bar{a}$  через замкнутую поверхность  $S$  (нормаль внешняя).

$n/n$	$\bar{a}$	$S:$	ответ
7.1	$(e^x + 2x)\bar{i} + e^x\bar{j} + e^y\bar{k}$	$x + y + z = 1, x = 0$	$\frac{1}{3}$
7.2	$(3z^2 + x)\bar{i} + (e^x - 2y)\bar{j} + (2z - xy)\bar{k}$	$x^2 + y^2 = 2^2, z = 1, z = 4$	$14\pi$
7.3	$(\ln y + 7x)\bar{i} + (\sin z - 2y)\bar{j} + (e^y - 2z)\bar{k}$	$x^2 + y^2 + z^2 = 2x + 2y + 2z - 2$	$4\pi$
7.4	$(\cos z + 3x)\bar{i} + (x - 2y)\bar{j} + (3z + y^2)\bar{k}$	$z^2 = 8(x^2 + y^2), z = 6$	$8\pi$
7.5	$(e^{-x} - x)\bar{i} + (xz + 3y)\bar{j} + (z + x^2)\bar{k}$	$x = 0, y = 0, z = 2$	$\frac{1}{8}$
7.6	$\bar{a} = (6x - \cos y)\bar{i} - (e^x + z)\bar{j} - (2y + 3z)\bar{k}$	$x^2 + y^2 + z^2 = 2x + 3$	$7\pi$
7.7	$\bar{a} = (4x - 2y^2)\bar{i} + (\ln z - 4y)\bar{j} + (x + \frac{3z}{4})\bar{k}$	$x^2 + y^2 + z^2 = 2x + 3$	$8\pi$
7.8	$\bar{a} = (1 + \sqrt{z})\bar{i} + (4y - \sqrt{z})\bar{j} + xy\bar{k}$	$z^2 = 4(x^2 + y^2), z = 3$	$9\pi$
7.9	$\bar{a} = (\sqrt{z} - x)\bar{i} + (x - y)\bar{j} + (y^2 - z)\bar{k}$	$x = 0, y = 0, z = 6$	$-18$
7.10	$\bar{a} = (yz + x)\bar{i} + (x^2 + y)\bar{j} + (xy^2 + z)\bar{k}$	$x^2 + y^2 + z^2 = 2z$	$4\pi$
7.11	$\bar{a} = (e^{xy} + x)\bar{i} + (x - 2y)\bar{j} + (y^2 + 3z)\bar{k}$	$x = 0, y = 0, z = 1$	$\frac{1}{3}$
7.12	$\bar{a} = (\sqrt{z} - 2x)\bar{i} + (e^x + 3y)\bar{j} + \sqrt{y + x}\bar{k}$	$x^2 + y^2 + z^2 = 2, z = 5$	$\frac{17}{3}\pi$
7.13	$\bar{a} = (e^x + \frac{y^2}{4})\bar{i} + (2\pi x + \frac{y}{4})\bar{j} + \frac{y}{4}\bar{k}$	$x^2 + y^2 + z^2 = 2x + 2y - 2z - 2$	$\pi$
7.14	$\bar{a} = (3x - 2z)\bar{i} + (2 - 2y)\bar{j} + (1 + 2z)\bar{k}$	$z^2 = 4(x^2 + y^2), z = 2$	$2\pi$
7.15	$\bar{a} = (e^y + 2x)\bar{i} + (x - y)\bar{j} + (2z - 1)\bar{k}$	$x + 2y + z = 2, x = 0, y = 0$	$2$
7.16	$\bar{a} = (x + y^2)\bar{i} + (xz + y)\bar{j} + (\sqrt{y + 1} + z)\bar{k}$	$x^2 + y^2 + z^2 = z^2, z = 2$	$19\pi$
7.17	$\bar{a} = (e^y + 2x)\bar{i} + (xz - y)\bar{j} + \frac{1}{4}(e^{xy} - z)\bar{k}$	$xy^2 + y^2 + z^2 = 2y + 3$	$8\pi$
7.18	$\bar{a} = (\sqrt{z} + y)\bar{i} + 3x\bar{j} + (3z + 5x)\bar{k}$	$z^2 = 8(x^2 + y^2), z = 2$	$\pi$
7.19	$\bar{a} = (8yz - x)\bar{i} + (xz^2 - 1)\bar{j} + (oy - 2z)\bar{k}$	$2x + 3y - z = 6, \frac{y}{z} = 0$	$-18$
7.20	$\bar{a} = (y + z^2)\bar{i} + (x^2 + 3y)\bar{j} + xy\bar{k}$	$x^2 + y^2 + z^2 = 2x$	$4\pi$
7.21	$\bar{a} = (2yz - x)\bar{i} + (xz^2 + 2y)\bar{j} + (x^2 + y)\bar{k}$	$y - x^2 + z^2 = 1, x = 0, z = 0$	$\frac{1}{3}$
7.22	$\bar{a} = (\sin z + 2x)\bar{i} + ((\sin x - y)\bar{j} + (\sin y + 2z)\bar{k})$	$x^2 + y^2 + z^2 = z^2, z = 6$	$63\pi$
7.23	$\bar{a} = (\cos z + \frac{y^2}{4})\bar{i} + (e^x + \frac{y}{4})\bar{j} + (\frac{y}{4} - 1)\bar{k}$	$x^2 + y^2 + z^2 = 2z + 3$	$8\pi$
7.24	$\bar{a} = (\sqrt{z} + 1 + x)\bar{i} + (2x + y)\bar{j} + (\sin x + 3)\bar{k}$	$\frac{y^2}{z} = x^2 + y^2$	$\pi$
7.25	$\bar{a} = (5x - 6y)\bar{i} + (11x^2 + 2y)\bar{j} + (x^2 - 4z)\bar{k}$	$x^2 + y^2 + z^2 = 2, x = 0, y = 0, z = 0$	$2$

7.11

$\frac{-40}{3}$