

1. (a) 6; 2. (b) $\langle 6, 2 \rangle$. (c) $18/5$. (d) $6x + 2y - z - 20 = 0$.
2. $5cm^2$
3. (a) $\langle 1, \sqrt{2} \cos t, -\sqrt{2} \sin t \rangle$. (b) $x = \pi/4 + t, y = 1 + t, z = 1 - t$.
4. (a) $\langle 1, 1, -1 \rangle; \langle 3, -4, 5 \rangle$
 (b) $6/\sqrt{150}$
 (c) $x = 2 + t, y = -8t, z = -7t$
5. (a) $D = \{(x, y) | x^2 + y^2 \neq 1\}$ (the plane \mathbb{R}^2 without the unit circle centered at origin).
 (b) level lines are circles centered at $(0,0)$ with radius $\sqrt{\frac{k+1}{k-1}}$. It is sufficient to draw several level lines: f.ex. $k = 2: x^2 + y^2 = 3; k = 3, x^2 + y^2 = 2$.
6. (a) $1; -3$ (b) $dx - 3dy$ (c) -0.28 (d) $11/\sqrt{13}$. (e) $\sqrt{10}; \langle 1, -3 \rangle$
7. Hint: use Chain Rule.
8. (a) $2x + 6y - z = -6$
 (b) paraboloid (axis is parallel to z -axis, vertex at $(1, -3, 0)$)
9. $\frac{yze^{x+y} - z \cos(xyz)}{x \cos(xyz) - ye^{x+y}}; \frac{(2+y)yz e^{x+y} - xz \cos(xyz)}{xy \cos(xyz) - y^2 e^{x+y}}$
10. decreasing at rate $9600\pi cm^3/s$
11. $x = -2t, y = 1, z = \pi/2 + t$
12. (c) 3
13. $5y + z = 1$
14. saddle at $(0,0)$; local min at $(1,1)$
15. b.
16. c.
17. d.
18. e.
19. a.