Disclaimer: Questions out of the 7th Edition of the Textbook

12.4

2:

x\y	-1	0	1
2	4	6	8
3	1	3	5

6: The table cannot represent a linear function, as the difference between adjacent elements with constant x is different in the case of $x = 0$ and $x = 1$.

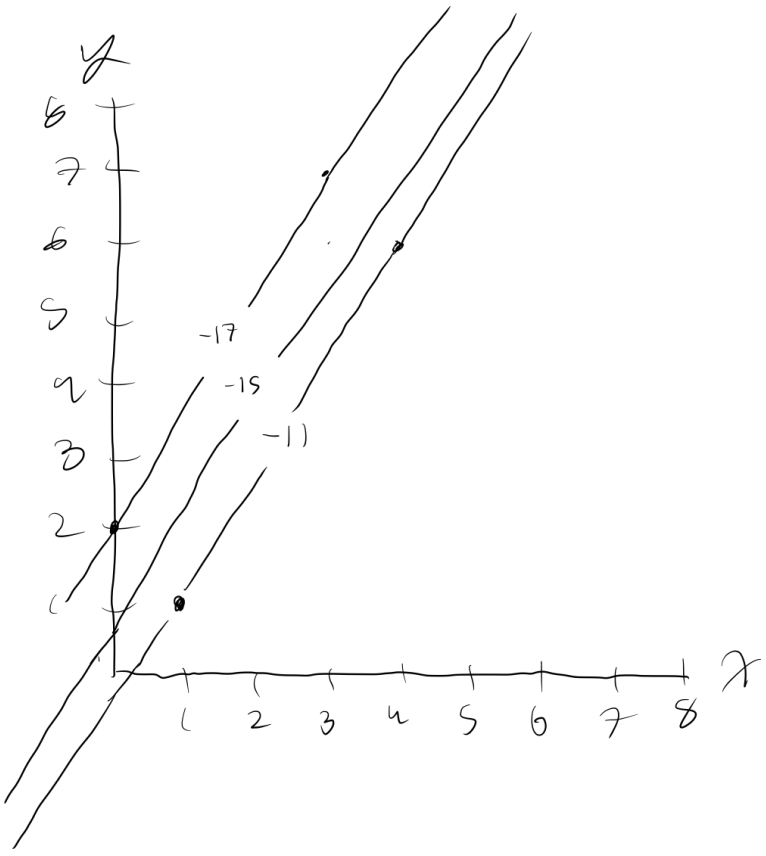
8: The linear function that passes through the points $(4, 0, 0)$, $(0, 3, 0)$, and $(0, 0, 2)$ is

$$3x + 4y + 6z = 12$$

12:

(a) $5x - 3y - 13 = z$

(b) The contour diagram is below:



16:

(a) f is a linear function.

(b) m is in dollars/month, and t is in dollars/gigabyte.

(c) $f(3, 8) = 269$, meaning that it costs \$269 in total to use 8 gigabytes of data over 3 months.

22:

$$z = 2x - y + 4$$

52: The contours of $f(x, y) = 3x + 2y$ are of the form $c = 3x + 2y$, meaning they have slope $-\frac{3}{2}$

12.5

2:

(a) II

(b) I

6:

$$f(x, y, z) = (x - a)^2 + (y - b)^2 + (z - c)^2$$

8: Elliptical Paraboloid

16:

(a) II

(b) III

(c) IV

(d) I

28:

$$g(x, y, z) = 2x + 3y - z$$

30:

(a) The surface is akin to all values of z such that $z = \sqrt{1 - x^2 - y^2}$, which is only the case if $z = 1$ at $(x, y) = (0, 0)$ and $x^2 + y^2 = 1$ at $z = 0$. The contours must be circles.

(b) $g(x, y, z) = x^2 + y^2 - z$, where $c = 1$.

12.6

2: If $x = 0$ and $y = 2$, then $\sqrt{2x - y}$ is not defined, so the function is not continuous on $x^2 + y^2 \leq 4$.

8:

$$\lim_{(x,y)\to(0,0)} f(x, y) = 0$$

10:

$$\lim_{(x,y)\to(0,0)} f(x, y) = 0$$

18: When approaching along the positive y axis, we have that the limit equals -1, while approaching along the positive x axis, we have that the limit equals 1.

13.1:

2:

- $\vec{a} = \langle 2, 1 \rangle$
- $\vec{b} = \langle 2, 0 \rangle$

- $\vec{c} = \langle -2, 0 \rangle$
- $\vec{d} = \langle -2, 2 \rangle$
- $\vec{e} = \langle -2, -1 \rangle$

4:

$$\vec{v} = \langle 3, 4 \rangle$$

8:

$$\vec{v} = -5\hat{i} - 4\hat{j}$$

12:

$$\vec{v} = -6\hat{i} - 5\hat{j} + 11\hat{k}$$

16:

$$\|\vec{z}\| = \sqrt{11}$$

36:

$$\vec{u} = \langle 3.2, 3.2 \rangle$$
$$\vec{v} = \langle -3.2, -3.2 \rangle$$

40: Counterclockwise from $\vec{v}$, they are $\vec{v} - \vec{u}$, $-\vec{u}$, $-\vec{v}$, and $\vec{v} - \vec{u}$.

46:

(i) $\|\vec{OB}\| = \sqrt{1 + 3} = 2$
(ii) $\|\vec{OC}\| = \sqrt{1 + 1/3 + 8/3} = 2$
(iii) $\|\vec{CB}\| = \sqrt{8/3 + 4/3} = 2$
(iv) $\|\vec{AB}\| = \sqrt{(2-1)^2 + 3} = 2$