Answers to Review #1

1. **(a)** $\sqrt{11}$

(b) -1

(c) $\theta = \cos^{-1}\left(1/\sqrt{11}\ \sqrt{35}\right)$

(d) $\dfrac{10}{11}\langle 1, 3, -1\rangle$

(e) $\cos\alpha = 5/\sqrt{35}\cos\beta = -1/\sqrt{35},\ \cos\gamma = 3/\sqrt{35}$

(f) 64

2. **(a)** $7(x-3) - 2(y+6) - 3(z-8) = 0$

(b) $\dfrac{x-1}{7} = \dfrac{y-3}{-2} = \dfrac{z+5}{-3}$;

$$\begin{cases} x = 1 + 7t \\ y = 3 - 2t \\ z = -5 - 3t \end{cases}$$

3. $\dfrac{x-1}{6} = \dfrac{y-3}{-3} = \dfrac{z}{-3}$

4. $d = -2 - 3\sqrt{6}$ **or** $d = 3\sqrt{6} - 2$

5. $\sqrt{10}/\sqrt{3}$

6. $\vec{b}_1 = \left\langle \dfrac{4}{5},\ 0,\ \dfrac{-2}{5}\right\rangle, \vec{b}_2 = \left\langle \dfrac{1}{5},\ 2,\ \dfrac{2}{5}\right\rangle$

7. $\left(\dfrac{-1}{2},\ \dfrac{7}{4},\ \dfrac{\sqrt{3}}{4}\right),\ \left(\dfrac{1}{2},\ \dfrac{1}{4},\ \dfrac{-\sqrt{3}}{4}\right)$

8. $x - 2y + z = 0$

9. $\dfrac{1}{2}$

10. $\dfrac{-1}{3}\langle 4, 1, -5\rangle$**.**

11. $\sqrt{\dfrac{1}{2}(A^2 + B^2 + C^2)}$**.**

12. **(a)** $\vec{T}(t) = \dfrac{1}{\sqrt{2}} \langle \cos 2t, \ \sin 2t, 1 \rangle$.

$\vec{N}(t) = \langle -\sin 2t, \ \cos 2t, 0 \rangle$**.**

$\vec{B}(t) = \dfrac{1}{\sqrt{2}} \langle -\cos 2t, \ -\sin 2t, 1 \rangle$, $\kappa(t) = e^{-t}$

(b) **1**

13. $2(8 - 2^{3/2})$**.**

14. **(a)** **1**

(b) **DNE**

15.

16.

$$
\begin{aligned}
f_x &= \cos(x - +3y) + 2xy^3 \\
f_y &= 3\cos(x + 3y) + 3x^2y^2 + 4y \\
f_{xx} &= -\sin(x + 3y) + 2y^3 \\
f_{xy} &= -3\sin(x + 3y) + 6xy^2 \\
f_{yy} &= -9\sin(x + 3y) + 6x^2y + 4
\end{aligned}
$$