

Answers to Review #1

1. (a) $\sqrt{11}$
(b) -1
(c) $\theta = \cos^{-1}(1/\sqrt{11} \sqrt{35})$
(d) $\frac{10}{11} \langle 1, 3, -1 \rangle$
(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) $\frac{x - 1}{7} = \frac{y - 3}{-2} = \frac{z + 5}{-3}$;
$$\begin{cases} x = 1 + 7t \\ y = 3 - 2t \\ z = -5 - 3t \end{cases}$$
3. $\frac{x - 1}{6} = \frac{y - 3}{-3} = \frac{z}{-3}$
4. $d = -2 - 3\sqrt{6}$ or $d = 3\sqrt{6} - 2$
5. $\sqrt{10}/\sqrt{3}$
6. $\vec{b}_1 = \left\langle \frac{4}{5}, 0, \frac{-2}{5} \right\rangle$, $\vec{b}_2 = \left\langle \frac{1}{5}, 2, \frac{2}{5} \right\rangle$
7. $\left(\frac{-1}{2}, \frac{7}{4}, \frac{\sqrt{3}}{4} \right)$, $\left(\frac{1}{2}, \frac{1}{4}, \frac{-\sqrt{3}}{4} \right)$
8. $x - 2y + z = 0$
9. $\frac{1}{2}$
10. $\frac{-1}{3} \langle 4, 1, -5 \rangle$.
11. $\sqrt{\frac{1}{2}(A^2 + B^2 + C^2)}$.

12. (a) $\vec{T}(t) = \frac{1}{\sqrt{2}} \langle \cos 2t, \sin 2t, 1 \rangle$.
 $\vec{N}(t) = \langle -\sin 2t, \cos 2t, 0 \rangle$.
 $\vec{B}(t) = \frac{1}{\sqrt{2}} \langle -\cos 2t, -\sin 2t, 1 \rangle$, $\kappa(t) = e^{-t}$

(b) 1

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

14. (a) 1

(b) DNE

15.

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