

REVIEW PROBLEM ANSWERS

1. $(-21, -11, 0)$
2. $-\frac{\pi}{2}x - 2y + 3z = -3$
3. No intersection
4. 54°
5. $x - 2y + 4z = -1$
6. $4x - 3y + 5z = 11$
7. $2x - y + 2z = 8$
8. Integral points on
 $5x + 2y + z = 37$ and
 $5x + 2y + z = -23$, eg $(5, 6, 0)$ and
 $(-3, -3, -2)$
9. $\vec{n}_a \cdot \vec{n}_b = 0$
10. $\vec{r}(t) = (t^3 + t + 7)\vec{i} + (-t^4 + 2t)\vec{j} + \left(\frac{t^2}{2} - 3t + 1\right)\vec{k}$
11. $\sqrt{3}(e^{2\pi} - 1)$
12. $\vec{r}'(t) = 12t^2\vec{i} - e^{-t}\vec{j} + 3\cos 3t\vec{k}$
13. $K = .00139 \quad r = 718.98$
14. $\left(\frac{\pi}{2}, 1\right), K = \frac{\sqrt{2}}{2}, C\left(\frac{\pi}{2} - 1, 2\right)$
15. Does not Exist
16. $f_{xx} = 12x^3 \ln y - y^2 \cos x - y^2 \sin xy,$
 $f_{xy} = f_{yx} = \frac{4x^3}{y} - 2y \sin x - xy \sin xy$
 $f_{yy} = \frac{x^4}{y} + 2 \cos x - x^2 \sin xy$
17. $\frac{1}{\sqrt{10}}$
18. $-\frac{38}{5}$
19. a) $0\vec{i} + 4\vec{j} + 6\vec{k}$ b) $4y + 6z = 14$
20. $4x - 3y + 20z = -15,$
 $x = -5 + 4t, y = 5 - 3t, z = 1 + 20t$
21. $a_T = \frac{18t^3}{\sqrt{9t^4 + 200}}, a_N = \frac{60t\sqrt{2}}{\sqrt{9t^4 + 200}}$
22. $\sqrt{5}$ in the direction of $\vec{i} + 2\vec{j}$
23. $-9600\pi \text{ cm}^3/\text{sec}$ (volume is decreasing at $9600\pi \text{ cm}^3/\text{sec}$)
24. $\frac{1-4e^2}{2}, e, -xye^{2xy} - e^{xy}, 0,$
 $24 \ln 2 + e - 16$
25. 36
26. $\left(\pm \frac{4}{3}, -\frac{4}{3}, -\frac{4}{3}\right)$
27. $r = 2 \text{ cm}, h = 4 \text{ cm}$
28. 3, 3, 3
29. min $(1, 2, 2)$, max $(-1, -2, 38)$,
saddle points $(-1, 2, 6), (1, -2, 34)$
30. 34
31. $\frac{81\pi}{2}$