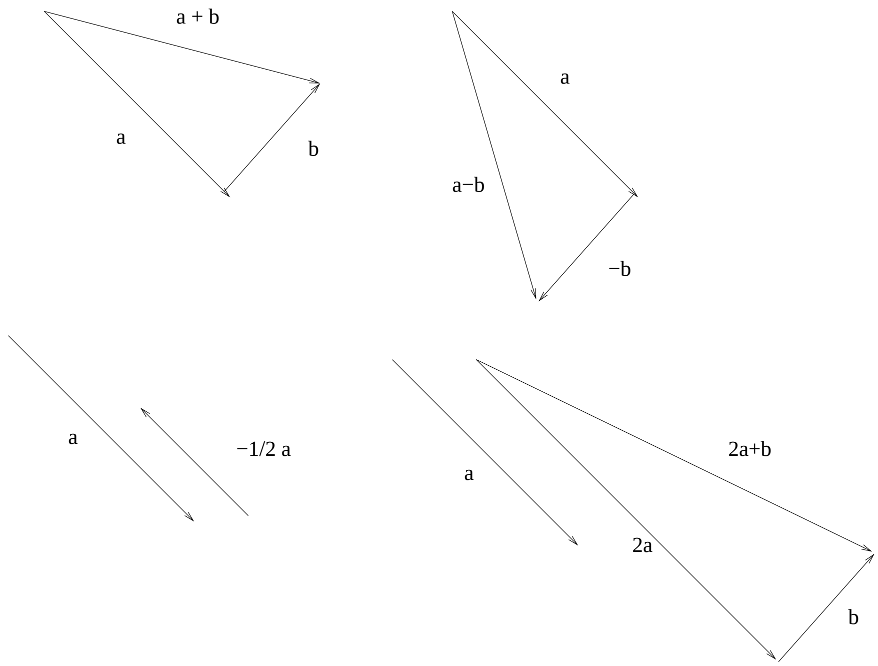
Answers to Even Exercises, Review problems from Ch 9 and 10

Chapter 9 #2



#4 (a) $< 11, -4, -1 >$, (b) $\sqrt{14}$, (c) -1, (d) $< -3, -7, -5 >$, (e) $3\sqrt{35}$, (f) 18, (g) $\vec{0}$, (h) $< 33, -21, 6 >$, (i) $\frac{1}{\sqrt{6}}$, (j) $< -1/6, -1/6, 1/3 >$, (k) 96°

#6 $\frac{1}{\sqrt{54}} < 7, 2, -1 >$ and $\frac{1}{\sqrt{54}} < -7, -2, 1 >$

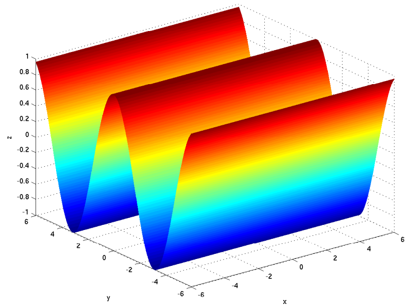
#12 87 joules

18 $x + 4y - 3z = 6$

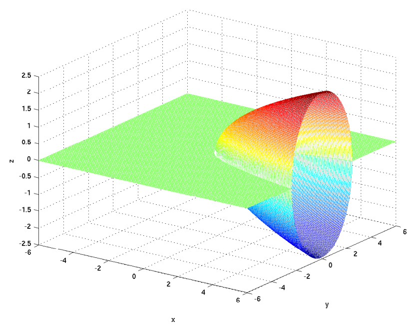
20 $6x + 9y - z = 26$

24 (a) $< 1, 1, -1 > \cdot < 2, -3, 4 > \neq 0$, and $< 1, 1, -1 > \times < 2, -3, 4 > \neq 0$, (b) 58°

30



34 Circular paraboloid opening in the direction of the positive x-axis.



40 (a) This is the plane that is perpindicular to the xy-plane and intersects the xy-plane in the line $y = x$. (b) This is the cone with vertex at the origin and opening along the z-axis.

42 In cylindrical: $r^2 = 4$. In spherical: $\rho \sin(\phi) = 2$.

44 This is the part of the solid sphere of radius 1 centered at $(0, 0, 1)$ that lies in the first octant and lies above the cone $\phi = \pi/6$.

Chapter 10 # 2 (a) Domain is $(-1, 0) \cup (0, 2]$, (b) $< \sqrt{2}, 1, 0 >$, (c) $\langle \frac{-1}{2\sqrt{2-t}}, \frac{te^t - e^t + 1}{t^2}, \frac{1}{1+t} \rangle$

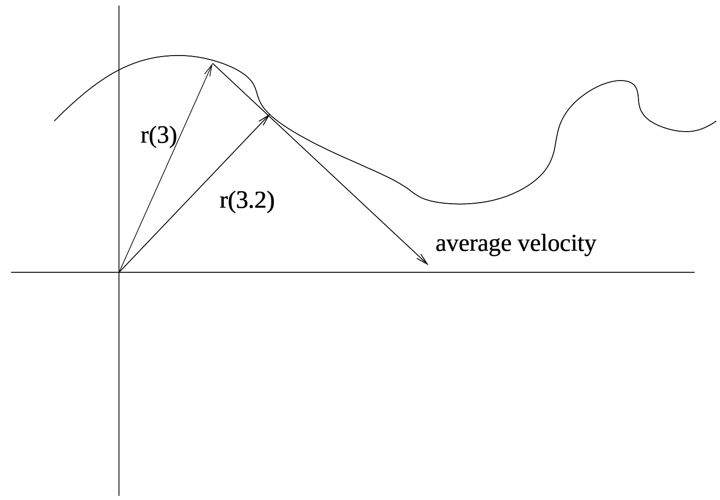
#6 (a) $(15/8, 0, -\ln 2)$, (b) $x = 1 - 3t$, $y = 1 + 2t$, $z = t$, (c) $3x - 2y - z = 1$

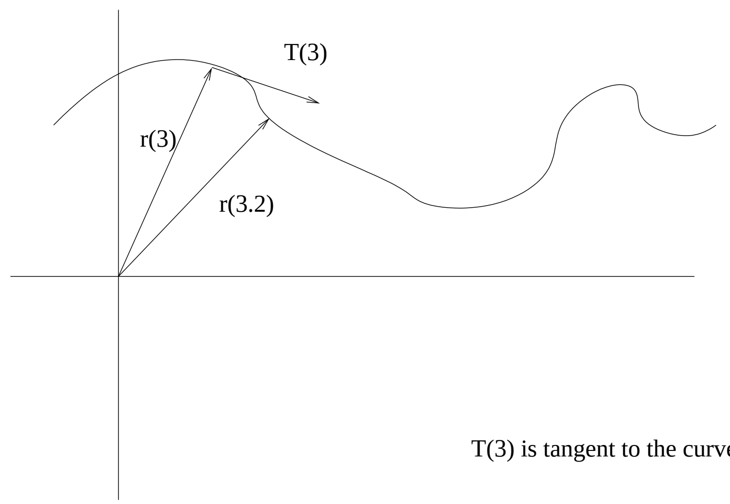
#8 $\frac{2}{27}(13^{3/2} - 8)$

#10 $\vec{r}(s) = \langle 1 + \frac{1}{\sqrt{3}}s, (1 + \frac{1}{\sqrt{3}}s)\sin(\ln(1 + \frac{1}{\sqrt{3}}s)), (1 + \frac{1}{\sqrt{3}}s)\cos(\ln(1 + \frac{1}{\sqrt{3}}s)) \rangle$

12 $\kappa(0) = 4/9$

16 (a) and (c) are below, (b) $\lim_{h\to 0} \frac{\vec{r}(3+h)=\vec{r}(3)}{h} = \vec{v}(3) = \vec{r}'(3)$





T(3) is tangent to the curve at r(3) and has length

18 $\vec{r}(t) = \langle t^3 + t, t^4 - t, 3t - t^3 \rangle$

#20 $a_T = \frac{4t}{\sqrt{4t^2+5}}$, and $a_N = \frac{2\sqrt{5}}{\sqrt{4t^2+5}}$