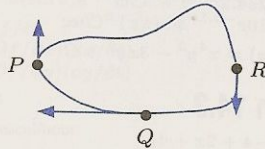


- (b) 0.32
 47 No
 49 (a) 2.24 m/sec
 (b) 1.89 m/sec
 51 Averages; weightings
 85.65%; class average
 53 $8\vec{i} - \vec{j}$

Section 13.4

- 1 $-\vec{i}$
 3 $-\vec{i} + \vec{j} + \vec{k}$
 5 $\vec{i} + 3\vec{j} + 7\vec{k}$
 7 $7\vec{i} + \vec{j} + 4\vec{k}$
 9 $-2\vec{k}$
 11 $\vec{i} - \vec{j}$
 13 $x - y - z = -3$
 15 $\vec{v} \times \vec{w} = -6\vec{i} + 7\vec{j} + 8\vec{k}$
 $\vec{w} \times \vec{v} = 6\vec{i} - 7\vec{j} - 8\vec{k}$
 $\vec{v} \times \vec{w} = -(\vec{w} \times \vec{v})$
 17 $4x + 26y + 14z = 0$
 19 $3x - y - 2z = 0$
 21 $4\vec{i} + 26\vec{j} + 14\vec{k}$
 23 $4(x - 4) + 26(y - 5) + 14(z - 6) = 0$
 25 (a) 1.5
 (b) $y = 1$
 27 Parallel to the z-axis
 29 $\sqrt{38}/3$
 43 $4\pi\vec{i}$
 45 (a) $((u_2v_3 - u_3v_2)^2 + (u_3v_1 - u_1v_3)^2 + (u_1v_2 - u_2v_1)^2)^{1/2}$
 (b) $|u_1v_2 - u_2v_1|$
 (c) $m = (u_2v_3 - u_3v_2)/(u_2v_1 - u_1v_2)$,
 $n = (u_3v_1 - u_1v_3)/(u_2v_1 - u_1v_2)$

- \vec{F} perp $= \vec{F}$
 $W = 0$
 33 \vec{F} parallel $= \vec{i} + \vec{j}$
 \vec{F} perp $= \vec{i} - \vec{j}$
 $W = 2$
 35 (a) True
 (b) False
 (c) False
 (d) True
 (e) True
 (f) False
 37 (a) $17.93\vec{i} - 7.07\vec{j}$
 (b) 19.27 km/hr
 (c) 21.52° south of east
 39



- 41 $\vec{v}_1, \vec{v}_4, \vec{v}_8$ all parallel
 $\vec{v}_3, \vec{v}_5, \vec{v}_7$ all parallel
 $\vec{v}_1, \vec{v}_4, \vec{v}_8$ perpendicular to $\vec{v}_3, \vec{v}_5, \vec{v}_7$
 \vec{v}_2 and \vec{v}_9 perpendicular
 43 $\vec{u} \perp \vec{v}$ for $t = 2$ or -1 .
 No values of t make \vec{u} parallel to \vec{v}
 45 $5x + y - 2z = 3$
 47 $\sqrt{6}/2$
 49 (a) \vec{u} and $-\vec{u}$ where
 $\vec{u} = \frac{12}{13}\vec{i} - \frac{4}{13}\vec{j} - \frac{3}{13}\vec{k}$
 (b) $\theta \approx 49.76^\circ$
 (c) $13/2$
 (d) $13/\sqrt{29}$
 51 $9x - 16y + 12z = 5$
 0.23

- 53 (a) (21/5, 0, 0)
 (b) (0, -21, 0); (0, 0, 3) (for example)
 (c) $\vec{n} = 5\vec{i} - \vec{j} + 7\vec{k}$ (for example)
 (d) $21\vec{j} + 3\vec{k}$ (for example)
 55 $7.0710\vec{i} + 2.5882\vec{j} + 6.580\vec{k}$
 59 $0, \vec{0}$
 61 (a) $\vec{c} = -\vec{i} - 4\vec{j} + 3\vec{k}$ or $\vec{c} = \vec{i} + 4\vec{j} - 3\vec{k}$
 (b) $\vec{i} + 4\vec{j} - 3\vec{k}$
 63 (a) $(tv - sw - ty + wy + sz - vz)\vec{i} + (-tu + rw + tx - wx - rz + uz)\vec{j} + (su - rv - sx + vx + ry - uy)\vec{k}$
 (b) $((s(u - x) + vx - uy + r(-v + y))/c)(a\vec{i} + b\vec{j} + c\vec{k})$

Ch. 13 Understanding

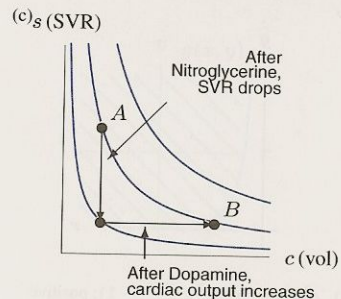
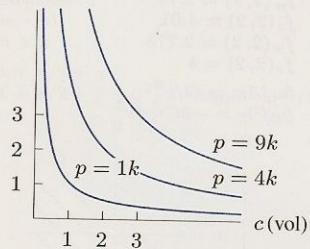
- 1 False
 3 True
 5 False
 7 False
 9 False
 11 False
 13 True
 15 True
 17 False
 19 True
 21 True

- 23 False
 25 False
 27 True
 29 True

Section 14.1

- 1 $f_x(3, 2) \approx 2, f_y(3, 2) \approx -1$
 3 (a) Dollars/Year
 (b) Negative
 (c) Dollars/Dollar
 (d) Positive
 5 $\partial P/\partial t$:
 dollars/month
 Rate of change in payments with time
 negative
 $\partial P/\partial r$:
 dollars/percentage point
 Rate of change in payments with interest rate
 positive
 7 (a) Negative
 9 $f_x > 0, f_y > 0$
 11 $f_x < 0, f_y < 0$
 13 $f_w(10, 25) \approx -0.4^\circ\text{F}/\text{mph}$
 15 $f_w(5, 20) \approx -0.8$
 17 Positive, Negative, 10, 2, -4
 19 -1.5 and -1.22
 21 (a) (i) Positive

- (ii) Negative
 (b) $f_x(P)$: from + to -
 $f_y(P)$: no change
 23 (a) 2.5, 0.02
 (b) 3.33, 0.02
 (c) 3.33, 0.02
 25 (a) $-3/8^\circ\text{C}/\text{m}, 2/5^\circ\text{C}/\text{min}$
 (b) $-1^\circ\text{C}/\text{m}, 3/28^\circ\text{C}/\text{min}$
 29 (b)_S (SVR)



Chapter 13 Review

- 1 Scalar; -1
 3 $\vec{a} = -2\vec{j}, \vec{b} = 3\vec{i}, \vec{c} = \vec{i} + \vec{j}, \vec{d} = 2\vec{j}, \vec{e} = \vec{i} - 2\vec{j}, \vec{f} = -3\vec{i} - \vec{j}$
 5 $5\vec{i} + 30\vec{j}$
 7 $3\sqrt{2}$
 9 $3\vec{i} + 7\vec{j} - 4\vec{k}$
 11 -3
 13 $\vec{0}$
 15 0
 17 $\vec{0}$
 19 $\vec{i} + 3\vec{j} + 2\vec{k}$ (multiples of)
 21 (a) 4
 (b) $-4\vec{i} - 11\vec{j} - 17\vec{k}$
 (c) $3.64\vec{i} + 2.43\vec{j} - 2.43\vec{k}$
 (d) 79.0°
 (e) 0.784.
 (f) $2\vec{i} - 2\vec{j} + \vec{k}$ (many answers possible)
 (g) $-4\vec{i} - 11\vec{j} - 17\vec{k}$.

- 23 $\pm(-\vec{i} + \vec{j} - 2\vec{k})/\sqrt{6}$
 25 $\vec{n} = 4\vec{i} + 6\vec{k}$
 27 $\vec{i} - 2\vec{j} - 5\vec{k}$; other answers possible
 29 \vec{F} parallel $= 2\vec{i} + 4\vec{j}$
 \vec{F} perp $= \vec{0}$
 $W = 10$
 31 \vec{F} parallel $= \vec{0}$