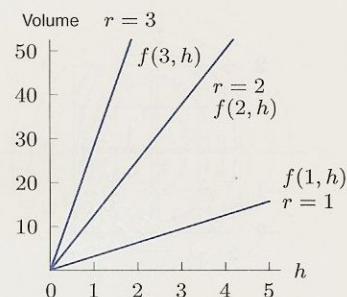
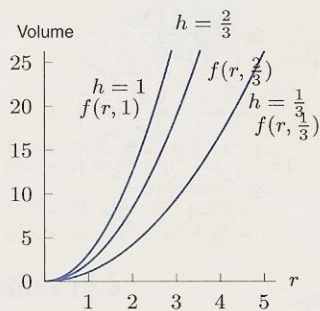


27 Doubles production

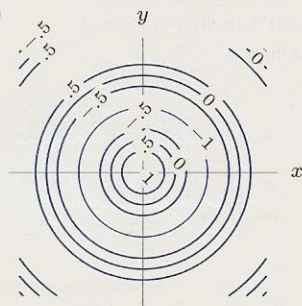
29

31 72°F; 76°F

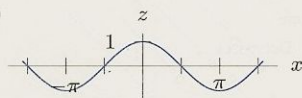
33



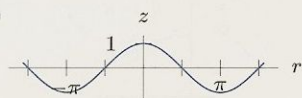
35 (a)



(b)



(c)



41 (a)  $9 + 3x + 4y$ ,  $21 + 7x + 8y$

(b)  $189 + 63x + 64y$

13 True

15 True

17 False

19 False

21 True

23 True

25 False

27 True

29 True

31 True

33 False

35 False

37 True

39 False

41 False

43 False

45 True

47 False

49 True

51 True

53 True

55 False

57 True

59 True

61 True

63 False

65 False

### Section 13.1

1  $\vec{a} = \vec{i} + 3\vec{j}$

$\vec{b} = 3\vec{i} + 2\vec{j}$

$\vec{v} = -2\vec{i} - 2\vec{j}$

$\vec{w} = -\vec{i} + 2\vec{j}$

3  $-3\vec{i} - 4\vec{j}$

5  $\vec{a} = \vec{b} = \vec{c} = 3\vec{k}$

$\vec{d} = 2\vec{i} + 3\vec{k}$

$\vec{e} = \vec{j}$

$\vec{f} = -2\vec{i}$

7  $\vec{i} + 3\vec{j}$

9  $-4.5\vec{i} + 8\vec{j} + 0.5\vec{k}$

11  $-3\vec{i} - 12\vec{j} + 3\vec{k}$

13  $0.9\vec{i} + 0.2\vec{j} - 0.7\vec{k}$

15  $\sqrt{6}$

17  $\sqrt{11}$

19 5.6

21  $-6\vec{i} + 20\vec{j} + 13\vec{k}$

23  $21\vec{j}$

25  $2\sqrt{73}$

27  $0.6\vec{i} - 0.8\vec{k}$

29 0, -10

31 (a)  $(3/5)\vec{i} + (4/5)\vec{j}$

(b)  $6\vec{i} + 8\vec{j}$

33 (a)  $\sqrt{2}\vec{i} + \sqrt{2}\vec{j}$

(b)  $(\sqrt{3}/2)\vec{i} + \vec{k}/2$

35  $\vec{p} = -\frac{4\sqrt{5}}{5}\vec{i} - \frac{2\sqrt{5}}{5}\vec{j}$

37  $-\vec{u}, \vec{v}, \vec{v} - \vec{u}, \vec{u} - \vec{v}$

39  $\vec{v} = 3\vec{i} + 4\vec{j}$  and  $\vec{v} = 3\vec{i} - 4\vec{j}$

41  $-40\vec{i} - 30\vec{j}$

### Section 13.2

1 Scalar

3 Scalar

5 Vector

7  $5\sqrt{2}\vec{i}, -5\sqrt{2}\vec{j}$

9  $21\vec{i} + 35\vec{j}$

11 (a) 8.64 km/hr

(b) 0.093 radian or about 5° off course

13 548.6 km/hr

15 3.4° north of east

17 38.7° south of east

19 (79.00, 79.33, 89.00, 68.33, 89.33)

21  $-11\vec{i} + 4\vec{j}$

23  $19.3\vec{i} - 5.1\vec{j}$  pounds

25 (a) 53.1° east of south

(b) 37.9° west of south; does not move

### Section 13.3

1 -14

3 14

5 -2

7  $28\vec{j} + 14\vec{k}$

9 185

11  $1.5\vec{i} + 3.2\vec{j} + \vec{k}$

(multiples of)

13  $-5\vec{i} + 3\vec{j} + \vec{k}$  (multiples of)

15 (a)  $(2/\sqrt{13})\vec{i} + (3/\sqrt{13})\vec{j}$

(b) Multiples of  $3\vec{i} - 2\vec{j}$

17 Possible answers:

(a)  $2\vec{i} + 3\vec{j} - \vec{k}$

(b)  $3\vec{i} - 2\vec{j}$

19 (a)  $\vec{F}$  parallel =  $-0.168\vec{i} - 0.224\vec{j}$

(b)  $\vec{F}$  perp =  $0.368\vec{i} - 0.276\vec{j}$

(c)  $W = -1.4$

21 (a)  $\vec{F}$  parallel =  $\vec{0}$

(b)  $\vec{F}$  perp =  $\vec{F}$

(c)  $W = 0$

23 (a)  $\vec{F}$  parallel =  $\vec{F}$

(b)  $\vec{F}$  perp =  $\vec{0}$

(c)  $W = -50$

25 (a)  $\vec{F}$  parallel =  $3.846\vec{i} - 0.769\vec{j}$

(b)  $\vec{F}$  perp =  $-3.846\vec{i} - 19.231\vec{j}$

(c)  $W = 20$

27 (a)  $\vec{F}$  parallel =  $\vec{0}$

(b)  $\vec{F}$  perp =  $\vec{F}$

(c)  $W = 0$

29 (a)  $(\vec{a}, \vec{c})$  and  $(\vec{b}, \vec{d})$

(b) None

(c)  $(\vec{a}, \vec{d})$  and  $(\vec{c}, \vec{d})$

(d)  $(\vec{a}, \vec{b})$  and  $(\vec{b}, \vec{c})$

31 1.91 radians (109.5°)

33 2, 8

35  $\vec{a} = -\frac{8}{21}\vec{d} + (\frac{79}{21}\vec{i} + \frac{10}{21}\vec{j} - \frac{118}{21}\vec{k})$

37  $3x - y + 4z = 6$

39  $2x - 3y + 7z = 19$

41  $3x + y + z = -1$

43 (a)  $\lambda = -2.5$

(b)  $a = -6.5$

45 (a)  $\sqrt{2}$

### Ch. 12 Understanding

1 Could not be true

3 Might be true

5 True

7 True

9 False

11 False