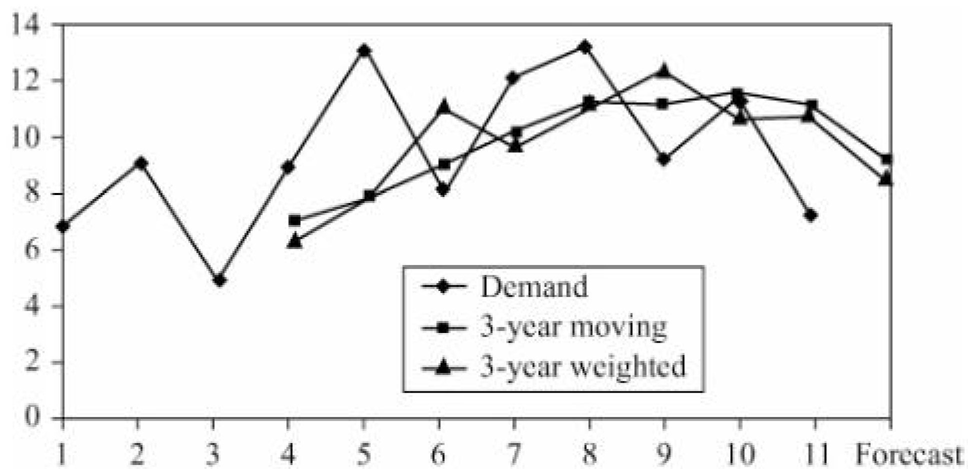
Solution Home Work 2

4.2 (a) No, the data appear to have no consistent pattern (see part d for graph).

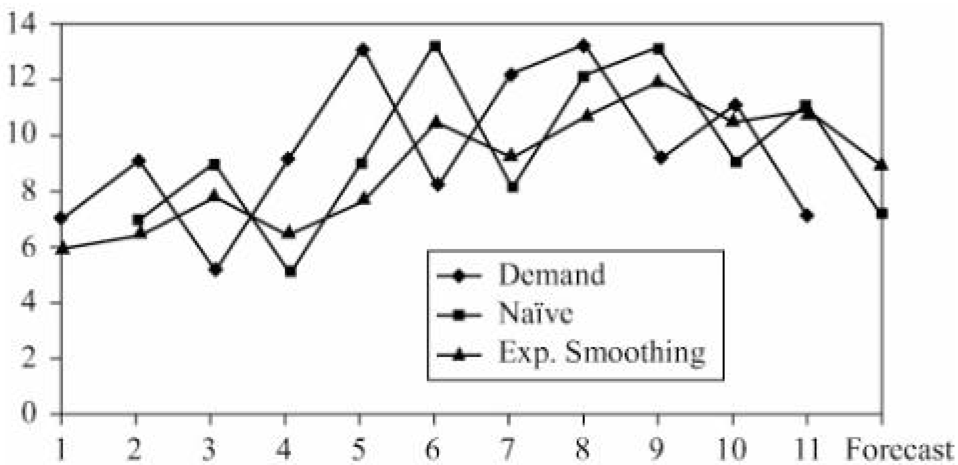
	Year	1	2	3	4	5	6	7	8	9	10	11	Forecast
	Demand	7	9	5	9.0	13.0	8.0	12.0	13.0	9.0	11.0	7.0	
(b)	3-year moving				7.0	7.7	9.0	10.0	11.0	11.0	11.3	11.0	9.0
(c)	3-year weighted				6.4	7.8	11.0	9.6	10.9	12.2	10.5	10.6	8.4

(d) The three-year moving average appears to give better results.



4.3

Year	1	2	3	4	5	6	7	8	9	10	11	Forecast
Demand	7	9.0	5.0	9.0	13.0	8.0	12.0	13.0	9.0	11.0	7.0	
Naïve		7.0	9.0	5.0	9.0	13.0	8.0	12.0	13.0	9.0	11.0	7.0
Exp. Smoothing	6	6.4	7.4	6.5	7.5	9.7	9.0	10.2	11.3	10.4	10.6	9.2



4.4 (a) $F_{\text{July}} = F_{\text{June}} + 0.2(\text{Forecasting error})$

$$= 42 + 0.2(40 - 42) = 41.6$$

(b) $F_{\text{August}} = F_{\text{July}} + 0.2(\text{Forecasting error})$

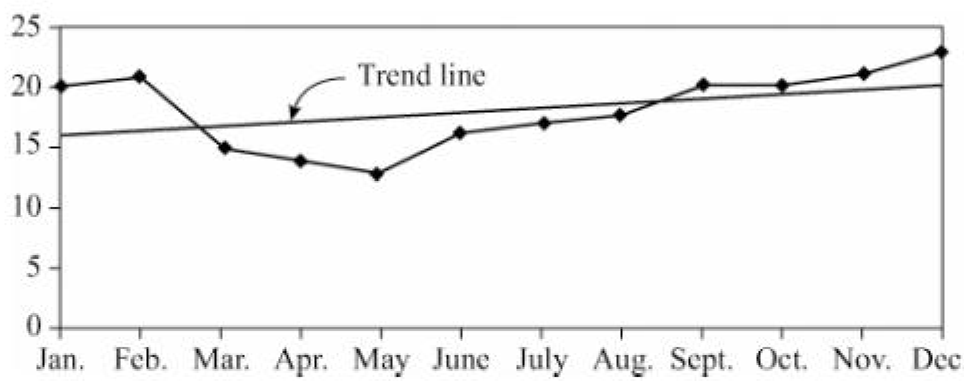
$$= 41.6 + 0.2(45 - 41.6) = 42.3$$

(c) The banking industry has a great deal of seasonality in its processing requirements

4.6

	Y Sales	*X* Period	X^2	*XY*
January	20	1	1	20
February	21	2	4	42
March	15	3	9	45
April	14	4	16	56
May	13	5	25	65
June	16	6	36	96
July	17	7	49	119
August	18	8	64	144
September	20	9	81	180
October	20	10	100	200
November	21	11	121	231
December	23	12	144	276
Sum	218	78	650	1,474
Average	18.2	6.5		

(a)



(b) [i] Naïve The coming January = December = 23

[ii] 3-month moving $(20 + 21 + 23)/3 = 21.33$

[iii] 6-month weighted $[(0.1 \times 17) + (.1 \times 18)$

$+ (0.1 \times 20) + (0.2 \times 20)$

$+ (0.2 \times 21) + (0.3 \times 23)]/1.0$

$= 20.6$

[iv] Exponential smoothing with alpha = 0.3

$$F_{Oct} = 18 + 0.3(20 - 18) = 18.6$$

$$F_{Nov} = 18.6 + 0.3(20 - 18.6) = 19.02$$

$$F_{Dec} = 19.02 + 0.3(21 - 19.02) = 19.6$$

$$F_{Jan} = 19.6 + 0.3(23 - 19.6) = 20.62 \approx 21$$

[v] Trend $\sum x = 78,\ \overline{x} = 6.5,\ \sum y = 218,\ \overline{y} = 18.17$

$$b = \frac{\sum xy - n\overline{x}\,\overline{y}}{\sum x^2 - n\overline{x}^2}$$

$$b = \frac{1474 - (12)(6.5)(18.2)}{650 - 12(6.5)^2} = \frac{54.4}{143} = 0.38$$

$$a = \overline{y} - b\overline{x}$$

$$a = 18.2 - 0.38(6.5) = 15.73$$

Forecast = 15.73 + .38(13) = 20.67, where next January is the 13th month.

4.7 Present = Period (week) 6.

a) So: $F_7 = \left[\left(\frac{1}{3}\right)A_6 + \left(\frac{1}{4}\right)A_5 + \left(\frac{1}{4}\right)A_4 + \left(\frac{1}{6}\right)A_3\right] \Big/ 1.0$

$$= \left(\frac{1}{3}\right)(52) + \left(\frac{1}{4}\right)(63) + \left(\frac{1}{4}\right)(48) + \left(\frac{1}{6}\right)(70) = 56.76 \text{ patients,}$$

or 57 patients

where $1.0 = \sum \text{weights } \frac{1}{3}, \frac{1}{4}, \frac{1}{4}, \frac{1}{6}$

b) If the weights are 20, 15, 15, and 10, there will be no change in the forecast because these are the same *relative* weights as in part (a), i.e., 20/60, 15/60, 15/60, and 10/60.

c) If the weights are 0.4, 0.3, 0.2, and 0.1, then the forecast becomes 56.3, or 56 patients.