

# Chapter 17 Solution

## Exercise 65

1. (a) The mean  
$$= \frac{8+9+14+18+2+5+1+0+0+10+6+11}{12}$$
$$= 7$$
 (A1) for correct formula  
A1 N2 [2]
- (b) 7 A1 N1 [1]
- (c) The inter-quartile range  
$$= 10.5 - 1.5$$
$$= 9$$
 (A1) for correct formula  
A1 N2 [2]
- (d) 5.51 A1 N1 [1]
2. (a) The mean  
$$= \frac{3+8+6+10+2+7+7+9}{8}$$
 (A1) for correct formula  
$$= 6.5$$
 A1 N2 [2]
- (b) (i) 7 A1 N1
- (ii) 8.5 A1 N1
- (iii) 4.5 A1 N1
- (iv) 4 A1 N1 [4]

3. (a)  $\frac{7+6+12+3+6+8+11+5+4+x}{10} = 7$  (A1) for correct formula  
 $62+x=70$   
 $x=8$  A1 N2 [2]
- (b) 6, 8 A2 N2 [2]
- (c) The inter-quartile range  
 $= 8-5$  (A1) for correct formula  
 $= 3$  A1 N2 [2]
4. (a) (i) 48 A1 N1
- (ii) 59 A1 N1
- (iii)  $\frac{(50+x)+62}{2} = 59$  (A1) for correct formula  
 $112+x=118$   
 $x=6$  A1 N2 [4]
- (b) 19 A1 N1 [1]
- (c) 6.29 A1 N1 [1]

## Exercise 66

1.	(a)	(i)	27.5	A1	N1	
		(ii)	$30 \leq x < 35$	A1	N1	[2]
	(b)	(i)	34.625	A2	N2	
		(ii)	6.06	A1	N1	
		(iii)	36.7	A1	N1	[4]
2.	(a)	$87 + 55 + 27 + 11 + f + 5 = 200$		(M1) for setting equation		
		$f = 15$		A1	N2	[2]
	(b)	(i)	Continuous	A1	N1	[2]
		(ii)	175 USD	A1	N1	
		(ii)	$0 \leq x < 50$	A1	N1	[3]
	(c)	(i)	81.75 USD	A2	N2	
(ii)		67.9 USD	A1	N1	[3]	
3.	(a)	12	A1	N1		
	(b)	(i)	18	A1	N1	[1]
		(ii)	$12 \leq x < 16$	A1	N1	[2]
	(c)	(i)	11.1	A2	N2	
		(ii)	4.95	A1	N1	[3]
	(d)	The upper bound for the greatest possible score $= 11.11111111 + 4.954110402$ $= 16.06522151$ Thus, the greatest possible score is 16.		(A1) for correct approach		
			A1	N2	[2]	

4. (a)  $p = 6, q = 5, r = 3, s = 2$   
 For any two correct answers A1  
 For all correct answers A1 N2 [2]
- (b)  $0 \leq x < 3$  A1 N1 [1]
- (c) (i) 2.87 A1 N1
- (ii) 3.09 A2 N2
- (iii) The percentage error  

$$= \left| \frac{3.086639556 - 2.871601252}{2.871601252} \right| \times 100\%$$
 (A1) for correct substitution  
 $= 7.488445823\%$   
 $= 7.49\%$  A1 N2 [5]

## Exercise 67

1. (a) (i)  $p = 14 + 7$   
 $p = 21$  A1 N1
- (ii)  $q = 39 - 21$  (M1) for valid approach  
 $q = 18$  A1 N2 [3]
- (b) The mean number of notebooks  
 $= \frac{(1)(14) + (2)(7) + (3)(18) + (4)(10) + (5)(1)}{50}$  (A1) for correct formula  
 $= 2.54$  A1 N2 [2]
- (c) 1.15 A1 N1 [1]
2. (a) (i)  $p = 53 + 37$   
 $p = 90$  A1 N1
- (ii)  $q = 165 - 115$  (M1) for valid approach  
 $q = 50$  A1 N2 [3]
- (b) The mean number of sit-ups  
 $(22)(32) + (23)(21) + (24)(37)$   
 $= \frac{+(25)(25) + (26)(50) + (27)(15)}{180}$  (A1) for correct formula  
 $= 24.47222222$   
 $= 24.5$  A1 N2 [2]
- (c) 2.60 A1 N1 [1]

3. (a)  $\frac{(1)(2) + (2)(4) + (3)(6) + (4)(16) + 5p + (6)(10)}{2 + 4 + 6 + 16 + p + 10} = 4.24$  (M1)(A1) for correct formula
- $\frac{5p + 152}{p + 38} = 4.24$  (A1) for simplification
- $5p + 152 = 4.24p + 161.12$
- $0.76p = 9.12$
- $p = 12$  A1 N4 [4]
- (b)  $q = 12 + 28 + 10$  (M1) for valid approach
- $q = 50$  A1 N2 [2]
- (c) Discrete A1 N1 [1]
4. (a)  $\frac{(7)(5) + (12)(3) + (17)(6) + (22)(5) + 27p}{5 + 3 + 6 + 5 + p} = 17.8$  (M1)(A1) for correct formula
- $\frac{27p + 283}{p + 19} = 17.8$  (A1) for simplification
- $27p + 283 = 17.8p + 338.2$
- $9.2p = 55.2$
- $p = 6$  A1 N4 [4]
- (b) The upper quartile
- $= \frac{19\text{th} + 20\text{th}}{2}$  (M1) for valid approach
- $= \frac{22 + 27}{2}$
- $= 24.5$  A1 N2 [2]

### Exercise 68

1. (a)  $a = 3$  A1 N1  
 $b = 14$  A1 N1 [2]
- (b)  $p > 14 + 1.5(6)$  (M1)(A1) for correct inequality [2]  
 $p > 23$  (A1) for correct value  
 Thus, the least value of  $p$  is 24. A1 N4 [4]
2. (a)  $a = 63$  A1 N1  
 $b = 73$  A1 N1 [2]
- (b)  $k > 73 + 1.5(10)$  (M1)(A1) for correct inequality [2]  
 $k > 88$  (A1) for correct value  
 Thus, the least value of  $k$  is 89. A1 N4 [4]
3. (a) (i) 34 A1 N1  
 (ii) 24 A1 N1  
 (iii) 12 A1 N1 [3]
- (b) As the median is 34, the number of data less than 34 is the same as that of greater than 34. (R1) for valid argument  
 $\therefore 2 + 4 = q + 1$  (A1) for correct equation  
 $q = 5$  A1 N3 [3]
4. (a) (i) 5 A1 N1  
 (ii) 8 A1 N1  
 (iii) 6 A1 N1 [3]
- (b) As the median is 5, the number of data less than 5 is the same as that of greater than 5. (R1) for valid argument  
 $\therefore 1 + r = 5 + 3 + 2$  (A1) for correct equation  
 $r = 9$  A1 N3 [3]

### Exercise 69

1. (a) The mean  
$$= \frac{150}{15}$$
$$= 10$$
(A1) for correct formula  
A1 N2 [2]
- (b) (i) 30  
A1 N1
- (ii) The new variance  
$$= (3^2)(8)$$
$$= 72$$
(M1) for valid approach  
A1 N2 [3]
2. (a) The sum of the items  
$$= (12)(9)$$
$$= 108$$
(A1) for correct formula  
A1 N2 [2]
- (b) (i) 19  
A1 N1
- (ii) The new standard deviation  
$$= \sqrt{2.25}$$
$$= 1.5$$
(M1) for valid approach  
A1 N2 [3]
3. (a) The upper quartile  
$$= \frac{20 + 22}{2}$$
$$= 21$$
(A1) for correct formula  
A1 N2 [2]
- (b) (i) 40  
A1 N1
- (ii) The new inter-quartile range  
$$= 4(21 - 10)$$
$$= 44$$
(M1) for valid approach  
A1 N2 [3]

4. (a) The lower quartile  

$$= \frac{8+12}{2}$$

$$= 10$$
(A1) for correct formula  
A1 N2 [2]
- (b) (i) 19  
A1 N1
- (ii) The new upper quartile  

$$= 10 + 5 + 19$$

$$= 34$$
(M1) for valid approach  
A1 N2 [3]

## Exercise 70

1. (a) (i) \$7.5 A2 N2
- (ii) 20 A1 N1 [3]
- (b) (i) The number of learning points  
 $= (5)(15)$   
 $= 75$  A1 N1
- (ii) The number of learning points  
 $= (5)(15) + (10)(20 - 15)$   
 $= 125$  (M1)(A1) for correct formula  
A1 N3 [4]
- (c) The amount raised  
 $= \frac{62.5}{5}$   
 $= \$12.5$   
Thus, the number of students  
 $= 120 - 50$   
 $= 70$  (A1) for correct formula  
A1 N3 [3]
- (d) The number of students awarded not more than  $k$   
learning points  
 $= 120 - 80$   
 $= 40$   
 $k = (5)(10)$   
 $k = 50$  (M1) for valid approach  
(A1) for correct value  
(A1) for correct formula  
A1 N4 [4]
- (e) Simple random sampling A1 N1 [1]

2. (a) (i) 1.5 cm A2 N2
- (ii) 20 A1 N1
- (iii) The percentage of fish  
 $= \frac{100 - 20}{200} \times 100\%$  (M1) for valid approach  
 $= 40\%$  A1 N2
- (iv) The number of fish not longer than  $k$  cm  
 $= 200 \times (1 - 90\%)$  (M1) for valid approach  
 $= 20$  (A1) for correct value  
 $\therefore k = 1$  A1 N3
- (b) The price [8]  
 $= (20)(4.5)$  (A1) for correct formula  
 $= \$90$  A1 N2
- (c) The number of fish [2]  
 $= 200 \times (1 - 10\%)$  (A1) for correct formula  
 $= 180$   
 180 fish are not longer than 4 cm.  
 Thus, 20 fish are longer than 4 cm.  
 $r = (20)(4)$  (A1) for correct value  
 $r = 80$  (A1) for correct formula  
 A1 N4
- [4]

3. (a) 25 minutes A2 N2 [2]
- (b) 15 minutes A2 N2 [2]
- (c) The number of students whose travelling time is within 5 minutes of the median  
 = The number of students whose travelling time is between 20 minutes and 30 minutes (M1) for valid approach  
 =  $120 - 60$  (A1) for correct formula  
 = 60 A1 N3 [3]
- (d) The number of students spent not more than  $k$  minutes to travel to school  
 =  $160 - 160 \times 6.25\%$  (A1) for correct formula  
 =  $160 - 10$   
 = 150 (A1) for correct value  
 $\therefore k = 40$  A1 N3 [3]
- (e)  $r = 30 + (1.5)(15)$  (M1)(A1) for correct formula  
 $r = 52.5$  A1 N3 [3]
- (f) Systematic sampling A1 N1 [1]

4. (a) 35 minutes A2 N2 [2]
- (b) 10 minutes A2 N2 [2]
- (c) The number of secretaries whose time for presentation is within 5 minutes of the upper quartile  
 = The number of secretaries whose time for presentation is between 35 minutes and 45 minutes (M1) for valid approach  
 =  $70 - 40$  (A1) for correct formula  
 = 30 A1 N3 [3]
- (d) The number of secretaries spent not more than  $k$  minutes to complete a presentation  
 =  $80(1 - 87.5\%)$  (A1) for correct formula  
 = 100 (A1) for correct value  
 $\therefore k = 25$  A1 N3 [3]
- (e)  $r = 40 + (1.5)(10)$  (M1)(A1) for correct formula  
 $r = 55$  A1 N3 [3]
- (f) The probability  
 $= \frac{80 - 75}{80}$  (M1) for valid approach  
 $= \frac{1}{16}$  A1 N2 [2]