

Section I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
D	C	A	B	A	A	D	C	B	D	B	C	A	B	D

Q1 D

Q2 Positive y-intercept, negative gradient C

Q3 A

Q4 B

Q5 English: 2σ from μ ; the others are less than 2σ . A

Q6 A

Q7 $180 \times 1.025^3 = 193.84$ D

Q8 Let x be the cost of parts before GST. $1.10x = 242$, $x = 220$ \therefore GST for parts = $242 - 220 = 22$

GST for labour = $100 \times 0.10 = 10$ \therefore total GST = $22 + 10 = 32$ C

Q9 $t = \frac{C}{n}$, 6 painters take 20 days $\therefore C = 120$ $\therefore t = \frac{120}{n}$

15 painters, $t = \frac{120}{15} = 8$ B

Q10 $p = 2(s - wt) = 2s - 2wt$ D

Q11 Time taken = $8:04\text{am} - 6:42\text{am} = 1\text{hr } 22\text{min} = 1\frac{11}{30}$ hr

Av. speed = $\frac{61}{1\frac{11}{30}} \approx 45$ B

Q12 $\frac{34}{157} \approx 0.22 = 22\%$ C

Q13 $\$300 \times 12 \times 4 = \14400 Interest = $14400 - 9000 = \$5400$
 $9000 \times r \times 4 = 5400$ $\therefore r = 0.15 = 15\%$ A

Q14 $P = R - C = 8x - (2.5x + 6) = 5.5x - 6$ B

Q15 Box plot shows wide inter-quartile range. D

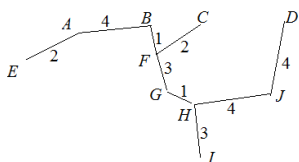
Section II

Q16a Shortest path $T-Y-W-H$: distance = $30 + 15 + 20 = 65$ km

Q16b Shortest path $Y-W-H-M-G$:
 length = $15 + 20 + 29 + 25 = 89$ km

Q17 $30.13 \times 0.650 \times 6 \approx 117.51 \approx \1.18

Q18a Weight = $2 + 4 + 1 + 2 + 3 + 1 + 3 + 4 + 4 = 24$



Q18b Yes, because some edges have the same weights.

Q19a Gradient = $\frac{20 - 6}{10} = 1.4$; vertical axis intercept = 6

\therefore Test mark = $1.4 \times$ assigned mark + 6

Q19b Predicted test mark = $1.5 \times 5 + 6 = 13$ \therefore Student did worse than predicted.

Q20a $\$200 \times 10.0266 = \2005.32

Q20b 4% p.a. $\therefore 2\% = 0.02$ per 6 months

Let x be the minimum amount required. $\frac{x \times 1.02(1.02^6 - 1)}{0.02} = 4500$

$\therefore x = 700$

Q21a 24% p.a. $\therefore 2\% = 0.02$ per month

	A	B	C	D	E
1	Month	Principal	Interest charged	Amount repaid	Balance owing
2	1	\$5590.00	\$111.80	\$110.00	\$5591.80
3	2	\$5591.80	\$111.84	\$110.00	\$5593.64

Interest charged in the 2nd month = $5591.80 \times 0.02 = 111.836 \approx 111.84$

Q21b The repayment \$110 is not sufficient to cover the monthly interest.

Q22

	W	K
1985 population	$A = 34$	$B = 280$
% yearly change	+5.5%	-3%
Population when $x = 50$	$34 \times 1.055^{50} \approx 494$	61

Q23 Let x be the hours of overtime.

$45 \times (38 + x \times 1.5) = 2790$ $\therefore x = 16$

Q24a $BAC_{\text{female}} = \frac{10 \times 1.2 \times 3 - 7.5 \times 2.5}{5.5 \times 60} \approx 0.052$

Q24b Time = $\frac{BAC}{0.015} \approx \frac{0.052}{0.015} = 3.46667$ hours = 3 hours 28 min

Q25 Alex: Interest = $\$1800 \times 0.075 \times 5 = \675

Jun: $\frac{6.0\%}{4} = 1.5\% = 0.015$ per quarter

Interest = $\$1800 \times (1.015^{20} - 1) = \624.34

\therefore Alex will have the greater amount.

Q26 From graph, read $w = 20$ cm for greatest area.

$A_{\text{greatest}} = -0.5 \times 20^2 + 20 \times 20 = 200$ cm² \therefore height $h = \frac{200}{20} = 10$ cm

Q27 Original plan, total repayment = $\$280 \times 12 \times 10 = \33600

Changed plan, total repayment = $280 \times 12 \times 5 + 250 \times 12 \times 7 = \37800

Repay more by $\$(37800 - 33600) = \4200

Q28 A is negatively skewed and B is positively skewed.

The median of A is higher than that of B .

A has a wider spread than B .

	A	B
Skewness	negative	positive
Central tendency	approx. 171	approx. 152
Spread (range)	approx. 40	approx. 28

Q29 End of first 4 years, value = $50000 - 1500 \times 4 = \44000

End of next 6 years, value = $44000 \times 0.65^6 \approx \3318.43

Total depreciation = $50000 - 3318.43 = \$46681.57$

Q30

Observation 1: Both males and females grow faster before maturity.

Observation 2: Both males and females have a linear growth before maturity.

Observation 3: Females are longer than males.

Observation 4: Little difference in length at birth between the two.

The gap widens with age because the males have a slow growth after maturity whilst the females continue a linear growth at a lower pace.

Q31a $\Pr(H) = \frac{2}{3}$

Q31b $\Pr(\text{at least one head}) = 1 - \Pr(\text{none}) = 1 - \frac{1}{3} \times \frac{1}{3} = \frac{8}{9}$

Q32a Sector area = $\frac{72}{360} \times \pi \times 30^2$; triangular area = $\frac{1}{2} \times 30^2 \sin 72^\circ$

Area of shaded region

= $5 \times \left(\frac{72}{360} \times \pi \times 30^2 - \frac{1}{2} \times 30^2 \sin 72^\circ \right) \approx 6.9 \times 10^2 \text{ cm}^2$

Q33 $40 \text{ km/h} = \frac{40000}{60 \times 60} = \frac{100}{9} \text{ m/s}$; time required = $\frac{150}{\frac{100}{9}} = 13.5 \text{ s}$

Q34 Surface area of cylindrical body = $\pi \times 32 \times 23 \times 2$

Surface area of the two ends = $\pi \left(\frac{23}{2} \right)^2$

Total surface area = $\pi \times 32 \times 23 \times 2 + \pi \left(\frac{23}{2} \right)^2 \approx 5039.9 \text{ cm}^2 \approx 0.5 \text{ m}^2$

Q35a $z = \frac{70 - 58}{15} = 0.8$ $\Pr(z < 0.8) = 0.7881$

$\therefore \Pr(58 < X < 70) = 0.7881 - 0.5 = 0.2881 \therefore 28.81\%$

Q35b 46 and 70 are the same 'distance' from the mean 58 on each side of the mean of a normal distribution which is symmetrical about the mean.

Q35c Top 10%, $\Pr(X < x) = 0.9$, $\Pr(z < 1.3) \approx 0.9$

$\therefore \frac{x - 58}{15} \approx 1.3$, $x \approx 77.5$ Since $0.9 < 0.9032 \therefore x \approx 77$

Q36a $\frac{BE}{\sin 27^\circ} \therefore BE \approx 25.4$

Q36b $\angle XBC = 180^\circ - 106^\circ = 74^\circ$; $\frac{20}{XB} = \tan 74^\circ$

$\therefore XB = \frac{20}{\tan 74^\circ} \approx 5.735$, $CD \approx 25.4 - 5.735 \approx 19.7 \text{ m}$

Q37

Sydney is 10 h ahead of UTC and Rio de Janeiro is 3 h behind UTC

\therefore Sydney is 13 h ahead of Rio de Janeiro.

3 pm Wed 20 July Rio de Janeiro will be 2 am Wed 20 July Sydney.

Allow 20 hours of flying time, Sakura will leave Sydney at 6 am Tue 19 July.

Q38 Volume of cylinder = $\pi \times \left(\frac{30}{2} \right)^2 \times 6 = 1350 \pi$

Volume of cone = $\frac{1}{5} \times \pi \times \left(\frac{30}{2} \right)^2 \times 6 = 270 \pi$

Number of slices = $\frac{(1350 + 270)\pi}{212} \approx 24$

Q39a Critical path is *BEGI*.

Q39b Duration of *I* = $19 - 12 = 7$ hours

Q39c Max time between start of *F* and end of *H* = $12 - 3 = 9$ hours

Q40 $\cos \angle DOA = \frac{38^2 + 42^2 - 67.5^2}{2 \times 38 \times 42} \therefore \angle DOA \approx 115^\circ$

$\angle NOA \approx 115^\circ - (360^\circ - 285^\circ) = 40^\circ$

\therefore bearing of *C* from *O* = $40^\circ + 180^\circ = 220^\circ$

Q41 2.4% per year = $\frac{2.4\%}{12} = 0.002$ per month

Start of last 12 years, amount = $1200 \times 106.592 = \$127910.40$

For this amount, let x be the amount required at the very beginning

(180 months ago), $x \times 1.002^{180} = 127910.40$, $x = 89272.147$

Start of the first 15 years, amount = $2000 \times 151.036 = \$302072.00$

Minimum amount = $89272.15 + 302072.00 = \$391344.15$

Please inform mathline@itute.com re conceptual and/or mathematical errors.