AI SL Practice Set 2 Paper 1 Solution

1. (a) (i) 40 A1 N1

(ii) 1 A1 N1

(iii) 0 A1 N1

[3]

(b) The mean number of watermelons

$= \frac{(0)(12)+(1)(10)+(2)(6)+(3)(5)+(4)(5)+(5)(2)}{12+10+6+5+5+2}$ (A1) for correct formula

$=1.675$ A1 N2

[2]

(c) Discrete A1 N1

[1]

2. (a) The required perimeter

$=120+350+370$ (M1) for valid approach

$=840\text{ cm}$

$=8.4\times10^2\text{ cm}$ A1 N2

[2]

(b) The required area

$= \frac{(120)(350)}{2}$ (M1) for valid approach

$=21000\text{ cm}^2$

$=2.1\times10^4\text{ cm}^2$ A1 N2

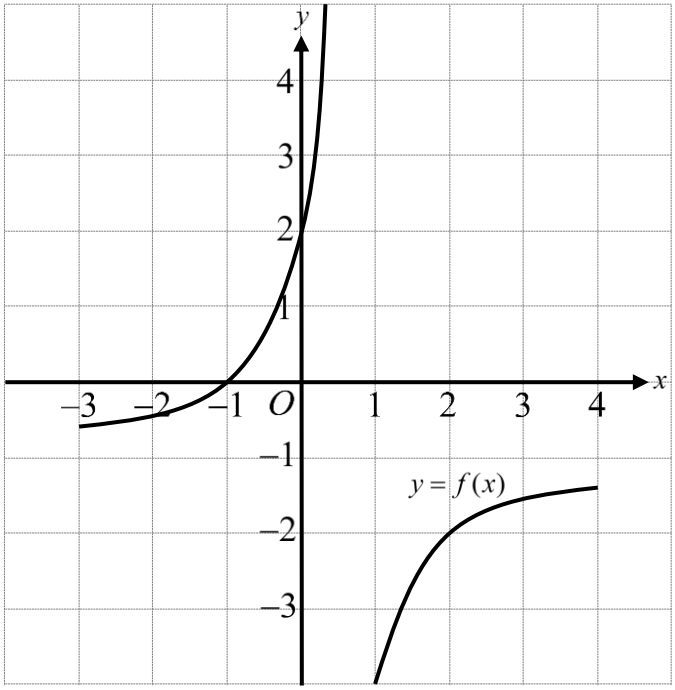
[2]

3. (a) For correct asymptotic behavior at $x = \frac{1}{2}$ A1

For correct intercepts A1

For correct shape A1 N3

[3]



(b) (i) $x = \frac{1}{2}$ A1 N1

(ii) -1 A1 N1

[2]

4. (a) Let h m be the height of the tower.

$\tan 21.7^\circ = \frac{h}{1.5}$ (M1) for valid approach

$h = 0.5969224984$ (A1) for correct value

Thus, the height of the tower is 597 m. A1 N3

[3]

(b) The percentage error

$= \left|\frac{596.9224984 - 603}{603}\right| \times 100\%$ (A1) for substitution

$= 1.007877552\%$

$= 1.01\%$ A1 N2

[2]

5. (a) (i) x_n A1 N1

(ii) z_n A1 N1

[2]

(b) The required term

$=100+(10-1)(200)$ (A1) for substitution

$=1900$ A1 N2

[2]

(c) The required sum

$=\frac{100(3^{10}-1)}{3-1}$ (A1) for substitution

$=2952400$ A1 N2

[2]

6. (a) (i) 3.5 A1 N1

(ii) 9.5 A1 N1

(iii) 2.5 A1 N1

[3]

(b) The period of d

$=\frac{360^\circ}{3^\circ}$ (M1) for valid approach

$=120$ minutes A1 N2

[2]

(c) $10:30$ am A1 N1

[1]

7. (a) $x+y=2000$ A1 N1

[1]

(b) (i) $50x+15y=73750$ A1 N1

(ii) $x=1250$ A1 N1

$y=750$ A1 N1

[3]

(c) The total cost

$=50(2)+15(12)$ (M1) for substitution

$=\$280$ A1 N2

[2]

8. (a) 16500 A1 N1

[1]

(b) The number of followers

$=16500(1.07)^{17}$ (M1) for substitution

$=52120.45098$

$=52120$ A1 N2

[2]

(c) $N(t)=500000$

$16500(1.07)^t=500000$ (M1) for setting equation

$16500(1.07)^t-500000=0$

By considering the graph of

$y=16500(1.07)^t-500000$, $t=50.418502$. (A1) for correct value

Thus, the corresponding year is 2023. A1 N3

[3]

9. (a) (i) The required radius

$=\sqrt{(12-8)^2+(14-11)^2}$ (A1) for substitution

$=5$ A1 N2

(ii) The required radius

$=\sqrt{\left(6-\frac{41}{7}\right)^2+\left(2-\frac{57}{7}\right)^2}$ (A1) for substitution

$=6.144518048$

$=6.14$ A1 N2

[4]

(b) F A1 N1

[1]

10. (a) By TVM Solver:

$N = ?$
$I\% = 2.95$
$PV = 120000$
$PMT = -2000$
$FV = 0$
$P/Y = 12$
$C/Y = 12$
$PMT : END$

(M1)(A1) for correct values

$N = 64.99449865$

Thus, the number of months to repay the loan is 65 months. A1 N3

[3]

(b) The amount of interest paid

$= (2000)(65) - 120000$ (M1)(A1) for substitution

$= \$10000$ A1 N3

[3]

11. (a) $E(X) = (54)(0.07)$ (A1) for substitution

$E(X) = 3.78$ A1 N2

[2]

(b) $P(X = 9)$

$= 0.0081914007$ (A1) for correct value

$= 0.00819$ A1 N2

[2]

(c) $P(X \geq 5)$

$= 1 - P(X \leq 4)$ (M1) for valid approach

$= 1 - 0.6733974584$ (A1) for correct value

$= 0.3266025416$

$= 0.327$ A1 N3

[3]

12. (a) The required cost

$= \frac{1}{2}(100-90)^2 + 60$ (M1) for substitution

$= \$110$ A1 N2

[2]

(b) $C(x) \le 1310$

$\frac{1}{2}(x-90)^2 + 60 \le 1310$ (M1) for setting inequality

$\frac{1}{2}(x-90)^2 - 1250 \le 0$

By considering the graph of

$y = \frac{1}{2}(x-90)^2 - 1250,\ 40 \le x \le 140.$

$\therefore n = 40$ A1 N2

[2]

(c) The minimum point of the graph of $C(x)$ is $(90, 60)$. (M1) for valid approach

Thus, the required number of jackets is 90. A1 N2

[2]

13. (a) $f(x) = \int \left(\frac{1000}{x^2} + 500x \right) \mathrm{d}x$ (M1) for indefinite integral

$f(x) = 1000\left(\frac{x^{-1}}{-1} \right) + 500\left(\frac{x^2}{2} \right) + C$ (A1) for correct approach

$f(x) = -\frac{1000}{x} + 250x^2 + C$ (A1) for correct approach

$600 = -\frac{1000}{2} + 250(2)^2 + C$ (M1) for substitution

$600 = 500 + C$

$C = 100$

$\therefore f(x) = -\frac{1000}{x} + 250x^2 + 100$ A1 N5

[5]

(b) $q = 5$ A1 N1

[1]

14. (a) (i) 0.683 A1 N1

(ii) 0.954 A1 N1

[2]

(b) $\mathrm{P}(H < 2.82)$

$= 0.4372698598$ (A1) for correct value

$= 0.437$ A1 N2

[2]

(c) $\mathrm{P}(H > r) = 0.28$ (M1) for valid approach

$\mathrm{P}(H < r) = 0.72$

$r = 2.960739885$

$r = 2.96$ A1 N2

[2]