Q1.

(a)

(i) b=5

(ii) $Q^{-1} = \begin{pmatrix} -\frac{1}{3} & -\frac{4}{15} \\ 1 & \frac{3}{5} \end{pmatrix}$

(b)

(i) $x = 25$

(ii) (a) 15

(b) 45

(c) 55

Q2.

(a)

$x_1 = 2.57$

$x_2 = -0.91$

(b)

(i)

(a) $4q + 6c$

(b) $\frac{4}{3}q + 4c$

(c) $6c + 2q$

(ii)

$\overrightarrow{OP} = \frac{2}{3}\overrightarrow{OM}$

$= \frac{2}{3}(2q + 6c)$

$= \frac{4}{3}q + 4c$

Since both vectors are proportional, the points O, P, and M are collinear

Q3.

(a) $\frac{1}{x-7}$

(b) **(i)** The first term a is **3** and the common ratio r is $\frac{1}{2}$

(ii) $T_n = 3\left(\frac{1}{2}\right)^{n-1}$

(iii) The sum to infinity of the progression is **6**

Q4.

(a)

START

INPUT s, r, N

IF s < 0 THEN

- PRINT "Error: s must be positive"

ELSE

- D = s * r / 100 * N
- DISPLAY D

ENDIF

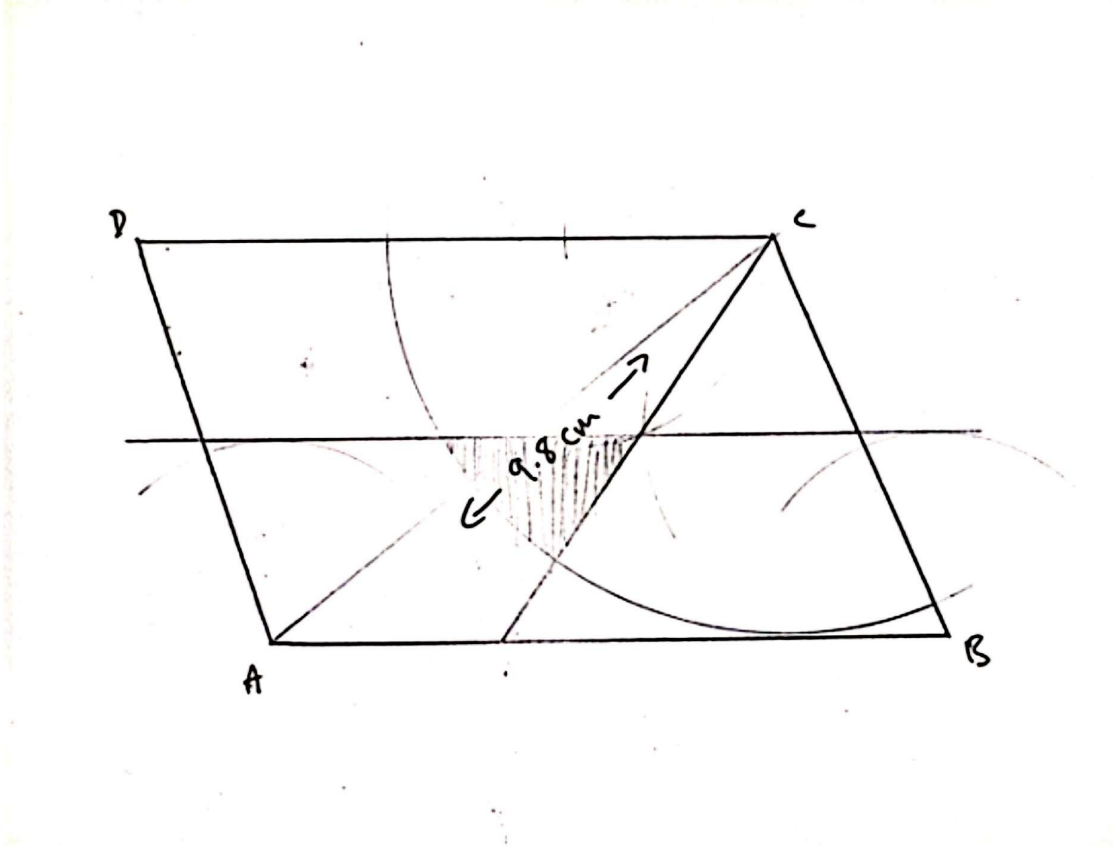
STOP

(b) **(i)** $\frac{2}{65}$

(ii) $\frac{21}{65}$

Q5.

(a)



Q6.

(a) 155

(b) $y = -x - 4$

Q7.

(a)

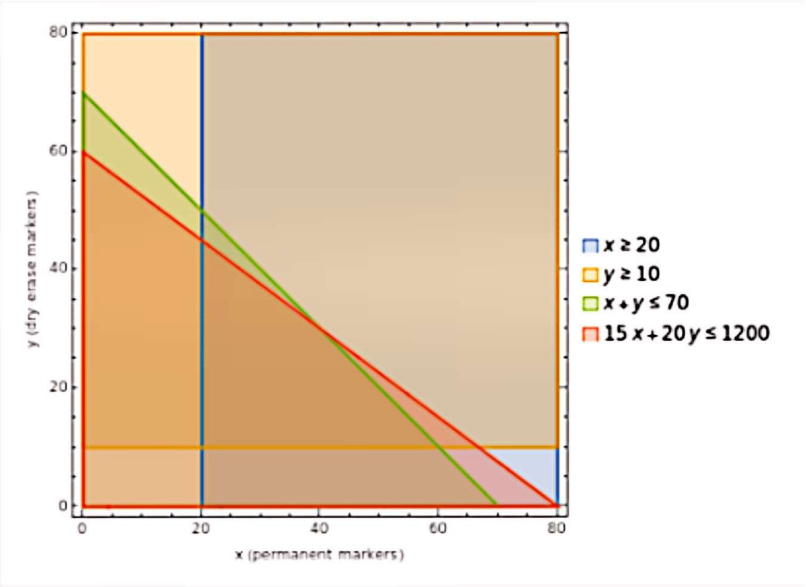
$x \geq 20$

$y \geq 10$

$x + y \leq 70$

$15x + 20y \leq 1200$

(b)



(c)

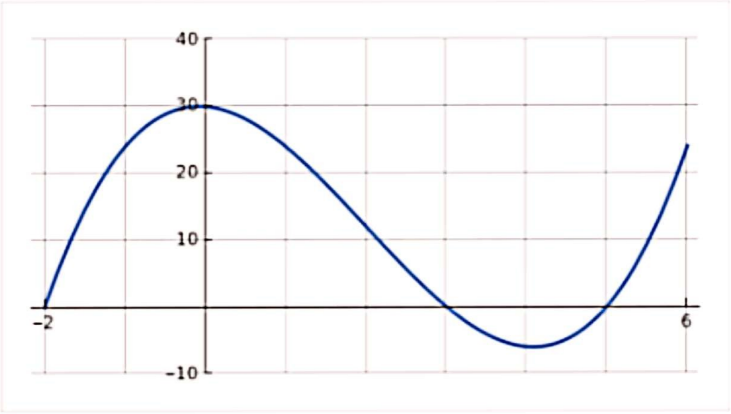
(i) **Number of markers for maximum profit**: 40 permanent markers and 30 dry erase markers.

(ii) **Maximum profit**: K1900.

Q8.

(a) (i) $k = 24$

(ii)



(iii) (a) The gradient at $(-1,24)$ is approximately 14.

(b) The area bounded by the curve, $x = -1$, $x = 2$, and $y = 0$ is 77.25 square units.

(b) $\frac{11x+17}{(x+5)(3x-4)}$

Q9

(a) (i) $97°$

(ii) The area of triangle **ABC** is approximately **1.24** km².

(iii) The shortest distance from **B** to line **AC** is approximately **0.886** km

(b) $\theta = 240°$

(c) $\frac{3yz}{5x}$

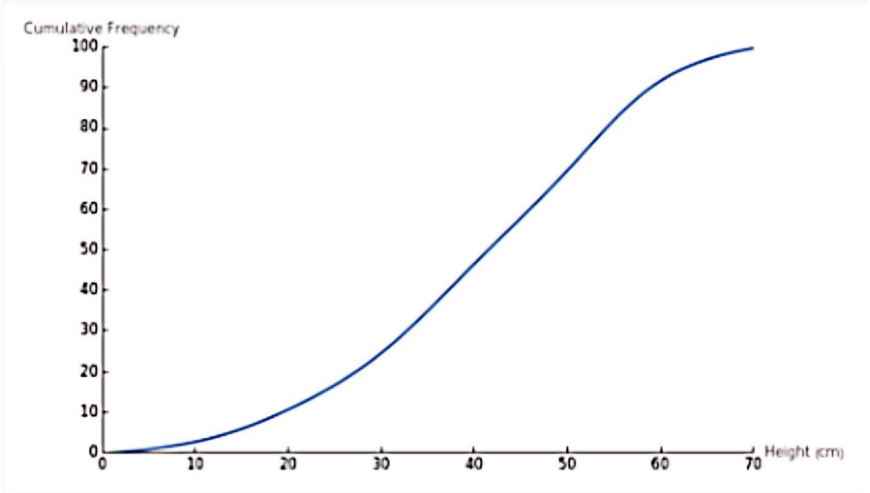
Q10

(a) The standard deviation of the heights of the plants is approximately **15.14 cm**

(b) (i)

Height (cm)	≤ 0	≤ 10	≤ 20	≤ 30	≤ 40	≤ 50	≤ 60	≤ 70
Cumulative frequency	0	3	11	25	47	70	92	100

(ii)



(iii)

Estimation from Graph:

From the graph:

- Q1 (25th percentile) is approximately at height = 27 cm
- Q3 (75th percentile) is approximately at height = 53 cm

Calculate SIR:

$$\text{SIR} = \frac{Q_3\text{-}Q_1}{2} = \frac{53 - 27}{2} = \frac{26}{2} = 13\text{cm}$$

The semi-interquartile range is approximately **13 cm**

Q11

(a) **(i)** $50°$

(ii) 6,671.51km

(iii) 30,664.05 km

(b) **(i)** $h = 15$

(ii) $1{,}523.87cm^3$

Q12

(a) $90°$ clockwise rotation at $(0, 0)$

(b) **(i)** $(0,0)$

(ii) -2

(c) $\begin{pmatrix} -2 & -3 \\ 0 & -5 \end{pmatrix}$

(d) A_4 (-2, -8)

B_4 (-3, -2)

C_4 (-4, -4)