

Math SL PROBLEM SET 13

Section A (Short Answer)

1. **(F2.5, C6.1 - E) (CA)** Let $f(x) = \frac{2x-6}{1-x}$ for $x \neq 1$. **(Cirrito 5.3.5, p144)**
- For the graph of f .
 - Find the x -intercept;
 - Write down the equation of the vertical asymptote;
 - Find the equation of the horizontal asymptote.
 - Find $\lim_{x \rightarrow \infty} f(x)$. That is, what is the “end behavior” of $f(x)$ as x gets really big?
2. **(SP5.1 - E) (CA)** The following table shows the average weights (y kg) for given heights (x cm) in a population of men. **(Oxford 10.2, p339; Oxford 10.3, p345)**

Heights (x cm)	165	170	175	180	185
Weights (y kg)	67.8	70.0	72.7	75.5	77.2

- The relationship between the variables is modelled by the regression equation $y = ax + b$.
 - Find the value of a and b ;
 - Hence, estimate the weight of a man whose height is 172cm.
- Write down the correlation coefficient
- Which **two** of the following describe the correlation between the variables:

Strong	Zero	Negative
Positive	No Correlation	Weak

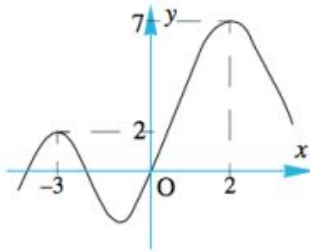
3. **(F2.1, A1.3 - E) (CI)** Let $f(x) = (x - 5)^3$, for $x \in R$. **(Cirrito 5.4.2, p157; Cirrito 5.4.1, p148)**
- Find $f^{-1}(x)$.
 - Let g be a function so that $(f \circ g)(x) = 8x^6$. Find $g(x)$.
 - Expand $(x - 5)^3$.
4. **(F2.6, A1.2 - R) (CI)** Given that $2^m = 8$ and $2^n = 16$, **(Cirrito 7.1.2, p201)**
- Write down the value of m and n .
 - Hence or otherwise solve $8^{2x+1} = 16^{2x-3}$.

Math SL PROBLEM SET 13

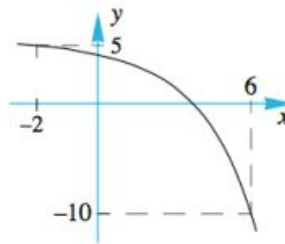
5. **(C6.1 - N) (CA)** Recall that an average rate of change between any two points on a function can be determined using the difference quotient $\frac{f(x_2) - f(x_1)}{x_2 - x_1}$. Find the average rate of change in the following examples. Sketch a diagram in each case. **(Cirrito 18.1.2, p582)**

- a. Use the two diagrams below to also calculate the average rate of change, given the x coordinates specified.

(d) $x \in [-3, 2]$



(e) $x \in [-2, 6]$



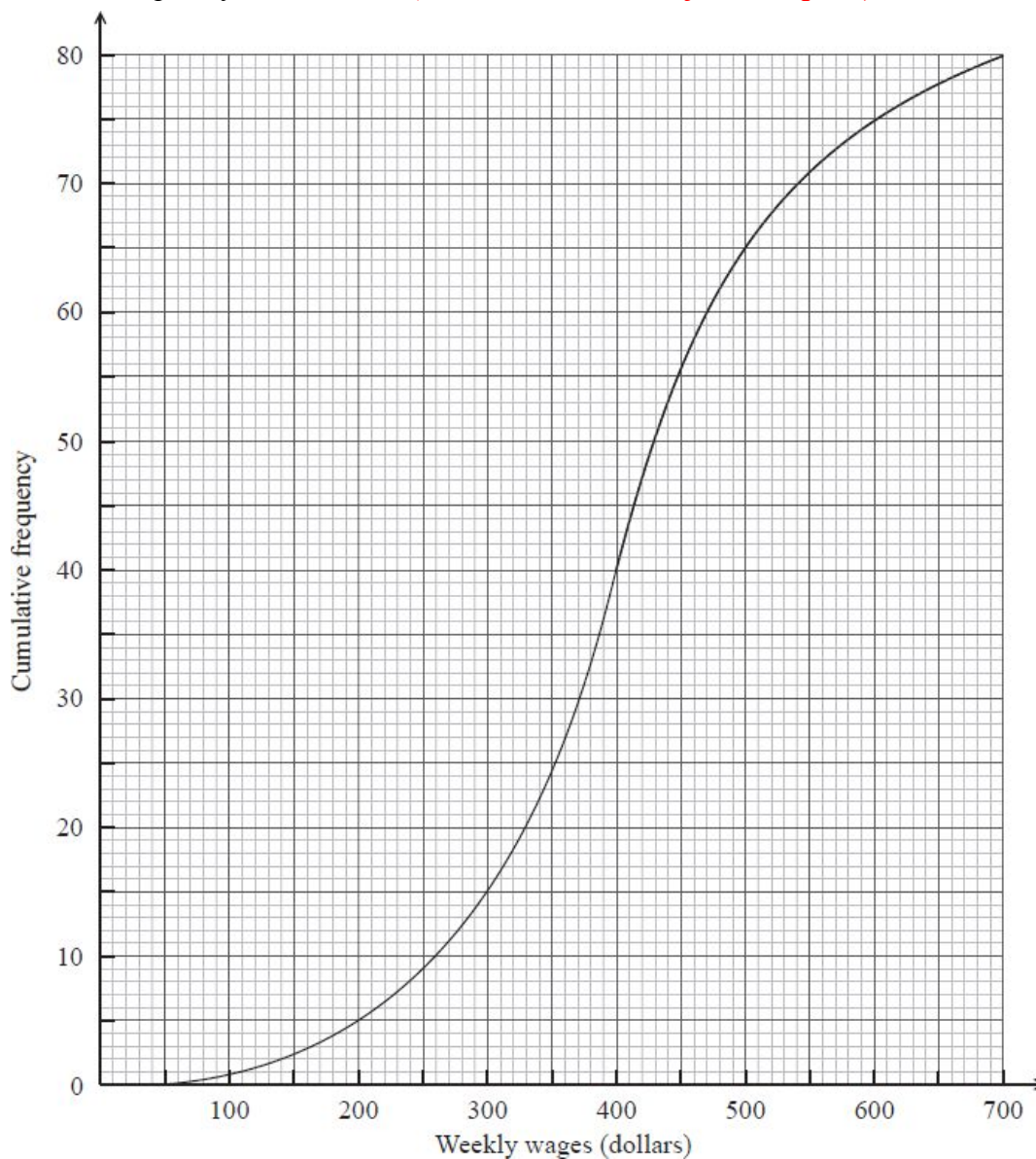
6. **(A1.1 - N) (CA)** In an arithmetic sequence, the first term is 2 and the second term is 5. **(Cirrito 8.1.1, p241)**
- List the first 5 terms of this sequence.
 - Find the common difference.
 - Find the eighteenth term.
 - Find the sum of the first eight terms of the sequence.

Section B (Extended Response/Investigation)

7. **(F2.3, F2.4 - E) (CA)** Consider the function $f(x) = x^2 - 4x + 1$. **(Cirrito 2.4.2, p44)**
- Sketch the graph of f , for $-1 \leq x \leq 5$.
 - This function can also be written as $f(x) = (x - p)^2 - 3$. Write down the value of p .
 - The graph of g is obtained by reflecting the graph of f in the x -axis, followed by a translation of $\begin{pmatrix} 0 \\ 6 \end{pmatrix}$. Show that $g(x) = -x^2 + 4x + 5$.
 - The graphs of f and g intersect at two points. Write down the x -coordinates of these two points.
 - A linear function, $h(x) = mx - 4$ is drawn on the same grid as $y = f(x)$. Find all possible values of m such that the line $h(x)$ and the quadratic function do not intersect.

Math SL PROBLEM SET 13

8. **(SP5.1.3 - E) (CI)** The weekly wages (in dollars) of 80 employees are displayed in the cumulative frequency curve below. *(Cirrito 13.2, 471; Oxford 8.5, p271)*



- a. Find:
- The weekly median wage
 - The interquartile range of the weekly wages
- b. The box-and-whisker plot below displays the weekly wages of the employees.



Write down the value of (i) a , (ii) b , (iii) c .

- c. Employees are paid \$20 per hour. Find the median number of hours worked per week.
- d. Employees are paid \$20 per hour. Find the number of employees who work more than 25 hours per week.