

# Math SL PROBLEM SET 66

1. **(SP5.1, SP5.6 - R) (CA)** Consider the given cumulative frequency table: **(Oxford 8.3, p260)**

$x$	frequency	cumulative frequency
2	4	4
4	6	10
6	$k$	20
8	9	29
10	7	36

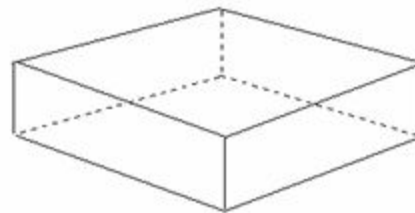
- a. Find the value of  $k$ .
- b. Find the mean and the variance.
- c. Determine  $P(x > 8 \mid x > 4)$ .
2. **(A1.3 - R) (CA)** The number of people participating in Maadi's annual Sum Fun Run has been monitored and it has been noticed that the number of participants has increased by 12.5% each year. In the first Sum Fun Run (held in 1990), forty people participated. **(Cirrito 8.2, p252)**
- a. Write down the number of people who participated in fun run in 1991.
- b. Find the number of people that participated in the fun run in 2018.
- c. In what year the total number of participants first exceed 15,000?
3. **(CA6.5 - N) (CI)** Mr. S wants to calculate the area under the curve of the function  $y = f(x)$  between  $x = 0$  and  $x = 4$  for the following functions. In each case, sketch the function, highlight the area and then determine the area. **(Cirrito 22.5, p748)**

a.  $f(x) = 2$

b.  $f(x) = x + 2$

c.  $f(x) = \sqrt{16 - x^2}$

4. **(CA6.3 - E) (CA)** Mr S takes a regular sheet of A4 paper (21 cm by 29.7 cm) and uses to construct an open top box (recall in IM3 ..... ) **(Cirrito 21.4, p702)**



- a. He cuts out the four corners, each measuring 2 cm by 2 cm. Determine the length, width and height of the box and hence, its volume.
- b. He cuts out the four corners, each measuring  $x$  cm by  $x$  cm. Determine an expression in  $x$  for the length, width and height of the box and hence, an equation for its volume.
- c. Determine the value for  $x$  that **optimizes** the volume of the box.

# Math SL PROBLEM SET 66

5. **(T3.6 - R) (CA)** Given the triangle  $FGH$ , where  $FG = 13$ ,  $GH = 10$  and angle  $HFG = 35^\circ$ .

(Cirrito 9.5.2, p294)

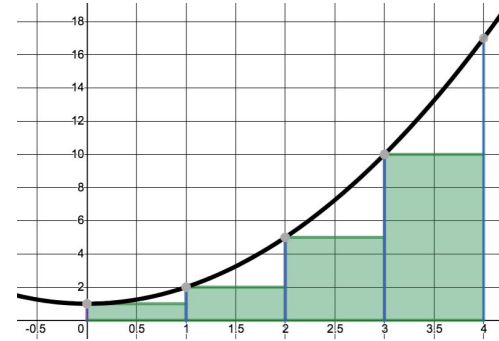
- Find the two possible values of angle  $FHG$ .
- Hence, find angle  $FGH$ , given that it is acute.

6. **(CA6.5 - N) (CA)** Mr. S wants to calculate the area under the curve of the function  $y = x^2 + 1$  between  $x = 0$  and  $x = 4$ . However, there seems to be a problem ..... So, to help, I have included a diagram to help get started with an **estimate**. (link:

<https://www.desmos.com/calculator/c5seq9ltar> )

(Cirrito 22.5, p748)

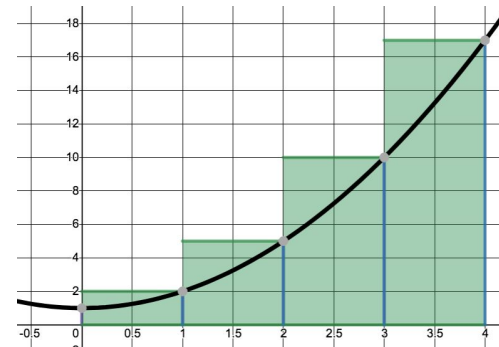
- Explain how the diagram is going to help us.
- Use the diagram to help make an estimate to the area under the curve.
- Is this estimate too high or too low?
- How can I make the estimate more accurate?



7. **(CA6.5 - N) (CA)** Mr. S wants to calculate the area under the curve of the function  $y = x^2 + 1$  between  $x = 0$  and  $x = 4$ . However, there seems to be a problem ..... So, to help, I have included a diagram to help get started with an **estimate**.

(Cirrito 22.5, p748)

- Explain how the diagram is going to help us.
- Use the diagram to help make an estimate to the area under the curve.
- Is this estimate too high or too low?
- How can I make the estimate more accurate?



8. **(A1.2 F2.7 - R) (CA)** For the function  $g(x) = \log_3 \frac{x}{2} + 2 \log_3 4 - \log_3 2$ , for  $x > 0$ .

(Cirrito 7.4, p221; Cirrito 5.4, p148)

- Show that equation for  $g(x)$  can be simplified to  $g(x) = \log_3(4x)$ .
- The inverse of  $g$  can be written in the form of  $g^{-1}(x) = ab^x$ . Determine the values of  $a$  and the value of  $b$ .
- Determine the solution(s) to the equation  $g^{-1}(x) = g(x)$ .