

**Assignment 1. Due date: Thursday 7 April 2011.**

This assignment is due by 4pm on Thursday 7 April 2011. It should be posted in the locked collection boxes on the verandah of Carlaw Level 3. These boxes are at the end of the verandah closest to Eastern Avenue. (NOT the locked collection boxes near the pyramids on Carlaw Level 3, nor the open pigeonholes.) Please do not post your assignment before Thursday 7 April 2011, since the boxes are also used for the collection of assignments in other units. Your assignment must be stapled inside a manilla folder, on the front of which you should write the initial of your family name as a LARGE letter. A cover sheet must be signed and attached. See page 25 of the Junior Mathematics Handbook for further information re submission of assignments. Assignments without a cover sheet, or in the incorrect format, may not be marked.

1. Consider the function  $f(x) = x^2 - 0.8x - 0.2$ .
  - (a) Factorise  $f(x)$ .
  - (b) Find the points where the graph of  $y = f(x)$  cuts the  $x$  and  $y$ -axes.
  - (c) Graph  $y = f(x)$ , marking on your diagram any points where the curve cuts the  $x$  and  $y$  axes.
  
2. Solve  $\sin(x + \frac{\pi}{4}) = \frac{1}{\sqrt{2}}$  for  $0 \leq x \leq \pi$ .
  
3. Consider the function  $f(x) = \sqrt{12 - x^2}$ .
  - (a) Find the domain and range of  $f(x)$ .
  - (b) Find  $f(-\sqrt{2})$ .
  - (c) Find and simplify  $f(x - 4)$ .
  - (d) Is  $f(x)$  even, odd, or neither? Explain your answer.
  
4. In 2010 data was published showing that if current trends of burning fossil fuel and deforestation continue, then in 2200 the amount of atmospheric carbon dioxide in parts per million (ppm) will have increased to 2300 ppm (from the 702 ppm it was in 2010).
  - (a) Suppose the function  $C(x) = C_0 e^{kx}$  models this information, where  $x$  is the number of years since 2010 and  $C(x)$  is the amount of carbon dioxide in the atmosphere. Find  $C_0$  and  $k$ .
  - (b) According to these calculations, what is the current level of atmospheric carbon dioxide?
  - (c) The preindustrial level of atmospheric carbon dioxide was 280 ppm. By which year will this level have tripled?