Computational Mathematics/Information Technology

Solutions Worksheet 2

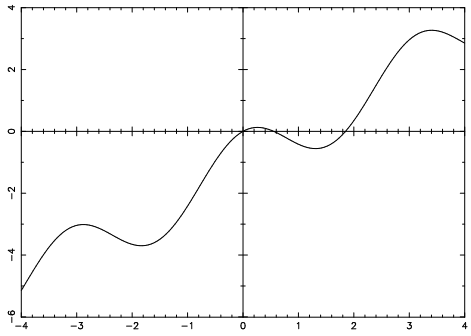
Iteration and Excel

1. For Task 1 write out the steps to show that $x = g(x) \quad \Rightarrow \quad f(x) = 0$.

$$x = \frac{1+x^2}{5} \quad \Rightarrow \quad 5x = 1 + x^2 \quad \Rightarrow \quad x^2 - 5x + 1 = 0 \quad \Rightarrow \quad f(x) = 0$$

[*2 marks*]

2. For Task 5 draw a sketch for $y = f(x)$ indicating the non-zero roots of $f(x) = 0$ correct to 1 decimal place.



The non-zero roots, x_1 and x_2 of $f(x) = 0$ correct to five decimal places are:

x_1 =0.55457 $\qquad$ x_2 =1.84908 [*2 marks*]

3. Write out your solution to Task 6

$$g(x) = x - \frac{f(x)}{f'(x)} = x - \frac{4\cos x - x}{-4\sin x - 1} = \frac{-4x\sin x - x - 4\cos x + x}{-4\sin x - 1} = \frac{4x\sin x + 4\cos x}{4\sin x + 1}$$

Thus writing this out as $x_n = g(x_{n-1}$ gives the answer. [*2 marks*]

4. From Task 8 the three solutions to $f(x) = 4\cos x - x = 0$ correct to five decimal places are:

$x_1 = -3.59530$ $\qquad$ $x_2 = -2.13333$ $\qquad$ $x_3 = 1.25235$ [*2 marks*]

5. From Task 10 write out the two answers to 4 decimal places:

$\log 5 = 0.6990$ ..... $\log 5 = 1.6904$ ..... [*2 marks*]

Marking Notes:

Allow 2 marks for a totally correct solution to a question. For any error, but otherwise a mostly correct solution, give 1 mark.