

1. [5 marks] Solve the equation:

$$4(x + 5 - 2x) - 3 = 5x - 9$$

2. [5 marks] Solve the inequality:

$$1 - \frac{2x - 7}{5} \geq 3$$

3. [5 marks] Perform the long division:

$$\frac{2x^3 - x^2 + x + 5}{x - 3}$$

4. [5 marks] Simplify:

$$\frac{x^2 - x + 2}{5x - 1} \div \frac{x^3 - x^2 + 6x}{5x^2 - 14x + 3}$$

5. [15 marks] Solve for x:

(a) [5 marks]  $x^2 - 7x + 10 = 0$

(b) [5 marks]  $3x^2 - 10x + 8 = 0$

(c) [5 points]  $\sqrt{5x + 6} - x = 0$

6. [6 marks] For the line with the equation  $x - 5 = 3y$

(a) Find the equation of the parallel line passing through the point (3,1);

(b) Find the equation of the perpendicular line passing through the point (2,1).

7. [5 marks] Sketch the graph of the function

$$f(x) = x^2 - 6x + 5$$

Find the x and y intercepts, the vertex and state the range.

8. (4 points) Given  $f(x) = \frac{1}{\sqrt{x}}$  and  $g(x) = x^2 - 1$ , find composite functions  $f \circ g(x)$ ,  $g \circ f(x)$  and their domains.

9. [5 marks]

10. [3 marks] Sketch the graph of the function  $f(x) = 2^x - 5$

11. [3 marks] Sketch the graph of the function over an interval of 2 periods  $f(t) = 2 \cos \left( \frac{\pi}{3} t \right)$

12. [12 marks] Solve for x:

(a)  $\log[\log x] = 0$

(b)  $\frac{2}{3} \cdot 27^{x-1} = 27$

(c)  $\log_4(x-1) + \log_4(x-2) = 1$

(d)  $5^{x^2} = 8^x$

13. (a) [3 marks] If  $\cos T = \frac{1}{5}$  and  $\sin T > 0$  find the exact value of  $\tan T$ .

(b) [3 marks] Verify the identity:  $\cot^2 x + 1 = \tan^2 x + \sin^2 x$ .

(c) [3 marks] Solve for  $x$  on the interval  $[0, 2\pi)$ :  $\cos^2 x - \sin^2 x = \frac{1}{2}$ .

(d) [3 marks] Use the reference angle to find the exact value of  $\sin(870^\circ)$ .

