

**MAS051 — Test 4 — Sample**

1. Find the tangent to the curve

$$y = 4x^3 - x^2 + 5$$

at the point where  $x = -2$ .

2. Use the product rule to differentiate

$$\left( \tan(x) + \frac{2}{x^9} \right) (\cos(x) - x^2)$$

3. Use the quotient rule to differentiate

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

4. Express

$$\frac{5 - 6i}{7 - 2i}$$

as a complex number of the form  $x + iy$ .

5. Solve the quadratic equation

$$5z^2 + 4z + 2 = 0.$$

6. Express

$$(2 - 5i)(3 + 7i)$$

as a complex number of the form  $re^{i\theta}$ , where  $r$  and  $\theta$  are real numbers and  $r \geq 0$ .

7. Solve the inequality

$$2x + 5 > x - 11$$

(give the range of values of  $x$  for which the inequality holds.)

8. Find the range of values of  $x$  for which the inequality

$$(6x + 7)(x - 11) \leq 0$$

holds.

9. Find the range of values of  $x$  for which the inequality

$$5x^2 + 2x - 3 \geq 0$$

holds.

10. Find the stationary points of the function

$$2x^3 + 3x^2 - 36x + 10$$

and determine their nature.