MATH6015: Sample Test 1

Name:
Student Number:

Answer all questions. All questions worth equal marks. Marks may be lost if necessary work is not clearly shown. There are a set of mathematical tables located at the back of this sample test.

1. Differentiate from first principles $y = 3x^2 - 4x + 3$.

2. Find the slope of the curve $y = x^2 - 6x + 5$ at the point (4,-3). Hence find the equation of the tangent line at this point.

3. Differentiate by rule

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

4. Differentiate by rule

$$y = x^2 \cos(2x).$$

5. Differentiate by rule

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

6. The displacement s in metres of an object after t seconds is given by

$$s(t) = 5t - 2\ln(1 - 2t).$$

Write down the velocity and acceleration at any time t.

7. The population N of a bacteria culture after t days is given by

$$N(t) = 100e^{-2t}.$$

Calculate $N'(10)$. Hence, or otherwise, explain why the population of the bacteria culture is decreasing after ten days.

Roughwork