

Higher Homework 7 - Differentiation

1. Find the equation of the tangent to the curve $y = 4x^3 - 2$ at the point where $x = -1$ **4**

2. Find the coordinates of the turning points of the curve with equation $y = x^3 - 3x^2 - 9x + 12$ and determine their nature **8**

3. A ball is thrown vertically upwards. The height h metres of the ball t seconds after it is thrown is given by the formula $h = 20t - 5t^2$
 - (a) Find the speed of the ball when it is thrown (i.e. the rate of change of height with respect to time of the ball when it is thrown) **3**

 - (b) Find the speed of the ball after 2 seconds and explain your answer in terms of the movement of the ball **2**

4. The point P(-2, b) lies on the graph of the function $f(x) = 3x^3 - x^2 - 7x + 4$.
 - (a) Find the value of b **1**

 - (b) Prove that this function is increasing at point P **3**

5. Differentiate $\sin 2x + \frac{2}{\sqrt{x}}$ with respect to x **4**

6. Given that $f(x) = 5(7 - 2x)^3$, find the value of $f'(x)$ **4**

7. A curve has an equation $y = 2x^3 + 3x^2 + 4x - 4$
Prove that this curve has **no** stationary points. **5**