

**Unit 5 Assignment****/40**

MCV4U

Due date: **Friday May 15<sup>th</sup>, 5:00pm**

1. Find the derivative of each of the following: **[9 marks]**

a)  $f(x) = \sqrt[3]{x^2 - 8x}$     b)  $y = \sin\left(\frac{3x}{2x-1}\right)$     c)  $f(x) = -2 \sin^2(2x)$

2. Find the maximum and minimum values of the function  $f(x) = \frac{-3x}{1+x^2}$  on the interval  $0 \leq x \leq 6$ . **[7 marks]**

3. Find the equation of the tangent to the curve  $x^2 = y^2x + 2$  at  $(-1, 1)$ . Use graphing software to find out what this curve looks like. Sketch the curve and the tangent line. **[8 marks]**

4. Jackie wants to design a cylinder shaped container to hold popcorn. Each container will be made from  $900\text{cm}^2$  of cardboard. The container will have no top on it. Find the dimensions of the cylinder (to the nearest tenth) that will maximize the volume of popcorn it will hold. **[8 marks]**



5. A rectangular picnic area of  $8000 \text{ m}^2$  is being constructed along the edge of a river. It will be fenced on three sides, but not along the river. Ornamental fencing costing \$8 per metre will be used on the side opposite the river and chain-link fencing costing \$3 per metre will be used on the other two sides. Find the **exact** dimensions of the picnic area that minimize the cost of fencing. **[8 marks]**