| <b>Dawson College: Calculus I:</b> 201-NYA-05-S4: Winter 201 | Dawson College | : Calculus I: | 201-NYA-05- | S4: Winter 2013 |
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| Name:       |  |
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| Student ID: |  |

## Test 2

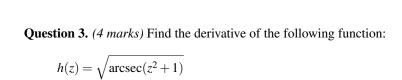
This test is graded out of 48 marks. No books, notes, graphing calculators or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

**Question 1.** (5 marks) Find the derivative of the following function and simplify:

$$f(x) = \frac{(3x^2 + 2)^5}{(5x+1)^6}$$

**Question 2.** (5 marks) Find the derivative of the following function:

$$g(t) = t^3 + \frac{1}{\sqrt{t}} + 2\sin t + 3\csc t + 4\arctan t$$



**Question 4.** (4 marks) Find the derivative of the following function:

$$f(x) = (3x^3 + x)^{3/2} \sqrt{2x - 1}$$

Question 5. The yearly demand for the Super Cool Fixed Gear bicycle is

$$p = 1000 - 0.04x \quad (0 \le x \le 20000)$$

where p denotes the wholesale unit price in dollars and x denotes the quantity demanded. The weekly total cost function associated with manufacturing the Super Cool Fixed Gear is given by

$$C(x) = 0.000003x^3 - 0.02x^2 + 300x + 70000$$

where C(x) denotes the total cost incured in producing x Super Cool Fixed Gear.

- a. (2 marks) Find the revenue function R and the profit function P.
- b. (3 marks) Find the marginal cost function C', the marginal revenue function R' and the marginal profit function P'.
- c. (2 marks) Compute P'(2000) and interpret your results.

**Question 6.** (6 marks) Find the third derivative of the following function. Simplify your final answer.

$$f(x) = \frac{x^2 + 1}{(2x+1)^2}$$

## **Question 7.** Using the demand function:

$$p = 1000 - 0.04x$$

- a. (3 marks) Calculate the elasticity of demand function E(p).
- b. (2 marks) Calculate the elasticity of demand when the price is set at \$750. Interpret the result.
- c. (1 mark) At what price is the demand unitary?

## Question 8. Given:

$$6 + \sqrt{2} - 2xy = \sqrt{y+1}$$

- a. (5 marks) Find  $\frac{dy}{dx}$ .
- b. (2 marks) Find the equation of the tangent to the graph of the given relation at (1,3)

**Question 9.** (5 marks) Find the equation of the tangent to the function  $f(x) = \tan 2x$  at  $x = \frac{\pi}{8}$ .

**Bonus Question.** (5 marks) Find the derivative of the following function but do *not* simplify.

$$f(x) = \cot\left(\sqrt{\frac{\arcsin(\tan x + x^2) + x}{\operatorname{arccot}(\sec x + e) - x}} + \pi\right)$$