QUEEN'S UNIVERSITY
APSC 171J – Quiz #1
Wesley Burr
Written: January 30, 2013

INSTRUCTIONS

- This quiz is being written in the tutorial (9:30-10:20am) Wednesday, January 30

- Answer all questions, writing clearly on the sheets provided.

- One mark in each question is for a **fully** correct solution, which **must** be placed in the box provided

- Whenever possible, simplify your solution.

- There are no part marks: you will receive only integer marks for each question.

- The quiz is **double sided** – make sure you look at both sides of each sheet of paper!

FOR INSTRUCTOR'S USE ONLY		
Question	Mark Available	Received
1	4	
2	4	
3	8	
TOTAL	16	

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1. [4 marks] Find $\dfrac{dy}{dx}$ if

$$y = \left(3x^2\right)^{\cos^2(x)}.$$

([3 marks] for process, [1 mark] for final answer in box below)

Final Answer:

2.   [4 marks] Find $\dfrac{dy}{dx}$ if
$$\tan(xy) = \frac{x}{y}.$$
([3 marks] for process, [1 mark] for final answer in box below)

Final Answer:

3.   [8 marks] Sheets of aluminum are used to construct cylindrical drinking cans: one sheet is used for the sides, and one disc for each of the top and the bottom of the cans. The sides are made from aluminum sheets with density 0.054 g/cm^2, while the top and bottom are made from thicker aluminum with density 0.090 g/cm^2. Find the height and radius of a 300 mL cylindrical can that uses the minimum **mass** of aluminum. Make sure you include an explanation why the dimensions you found really give a **global** minimum mass. *Note: mass is density times volume, but in the formulation given here, mass is density times surface area, and we assume the thickness of the aluminum is factored into the density value.*

([**2 marks**] for optimizing equation, [**3 marks**] for process, [**1 mark**] for classification as minimum, [**1 mark**] for demonstration of global property and [**1 mark**] for final answer.)

Please use the back of **this** sheet of paper for extra space and your final solution.

extra space for Question 3

Final Answer: