HOMEWORK ASSIGNMENT #4

due in class on Friday, October 4

Student No: _____ Name (Print): _____

Note: All homework assignments are due in class one week after being assigned. They must be on standard $8\frac{1}{2} \times 11$ size paper and they must be stapled. Assignments which are not stapled will not be accepted. I will not bring a stapler to class. Please enter your student number and name (as it appears on the registrar's list) in the spaces above. SURNAME FIRST IN CAPITALS, and given name second. Please put your answers in the boxes (if provided) and submit these pages for your assignment.

1. Each of the following questions can be done with little computation. Enter your answers in the boxes and show any work in the spaces provided.
Find all x such that $f'(x) = 0$, where:

(a) $f(x) = \cos(x^2)$

(b) $f(x) = \sin 2x$.

(c) $f(x) = 3x^5 - 5x^3$.

(d) $f(x) = x^3 + 5x^2 + 3x$.

2. Find the equations of the tangent lines to the graphs of $y = f(x)$ at $x = a$. Enter your answers in the boxes and show any work in the spaces provided.

(a) $f(x) = \dfrac{\sin 2x}{\cos x},\ a = \dfrac{\pi}{3}$

(b) $f(x) = |x^2 - 2x|,\ a = \dfrac{1}{2}.$

(c) $f(x) = \sin^2 \dfrac{\pi x}{3},\ a = 5.$

(d) $f(x) = \dfrac{\sin x}{1 + \cos x},\ a = \dfrac{\pi}{3}.$

3. A rectangle of fixed perimeter p cm is rotated around one of its sides to sweep out a right circular cylinder (see # 8, page 159). What is the maximum possible volume of this cylinder?

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4. Find the maximum possible volume of a right circular cylinder if its total surface area, including both ends, is A cm^2. See # 12, page 159.

5. A piece of wire L cm long is cut into 2 pieces. One piece is made into a circle and the other into a square. Where should the cut be made so as to maximize the sum of the areas of the circle and square?

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6. Find the dimensions of the rectangle (with sides parallel to the coordinate axes) of maximal area that can be inscribed in the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, where a, b are positive. See # 36 on p. 161.