University of Lethbridge
Department of Mathematics and Computer Science
MATH 1560 - Tutorial #9
Monday, February 12

Student #1 :_____

Student #2 :_____

Student #3 :_____

Student #4 :_____

Some additional practice (discuss the answers but don't write anything down):

1. Compute the derivative:

   (a) $\frac{d}{dx}(e^x \cos(x))$ (c) $\frac{d}{dx}(1+x^2)^{12}$ (e) $\frac{d}{dx}\ln(\sin(x))$

   (b) $\frac{d}{dx}\sec(x)$ (d) $\frac{d}{dx}\frac{e^x}{x}$ (f) $\frac{d}{dx}2\sin^4(x)$

2. Evaluate the immediate integral:

   (a) $\int (3x^2 + 1 + \frac{1}{x} + \frac{1}{x^2})\,dx$ (b) $\int x(x^2+5)^4\,dx$

3. Given $y(x) = \pi x(50 - x)$, solve $y'(x) = 0$.

4. Given $D(x) = \sqrt{5x^2 + 20x + 25}$, solve $D'(x) = 0$

1. Compute the derivative:

(a) $\dfrac{d}{dx}\sin(1/x) \quad =$

(b) $\dfrac{d}{dx}\ln(A + Bx^4) \quad =$ A, B positive constants.

(c) $\dfrac{d}{dx}\sqrt{1 + x^4} \quad =$

(d) $\dfrac{d}{dx}\ln[f(x)g(x)] \quad =$

2. Evaluate the integral:

(a) $\displaystyle\int 10\cos(x)\sin^4(x)\,dx \quad =$

(b) $\displaystyle\int 6x\sqrt{x^2 + 7}\,dx \quad =$

(c) $\displaystyle\int \frac{2x + \cos(x)}{x^2 + \sin(x)}\,dx \quad =$

(d) $\displaystyle\int \frac{dx}{x\ln^3|x|} \quad =$

3. Given $V(r) = \pi H \left((r^2 - \frac{r^3}{R} \right)$, with H and R constants, solve $V'(r) = 0$.

4. Given $y(x) = e^{-x^2}$, solve $y''(x) = 0$.

5. Find the minimum possible cost for a square based, 12 litre box, with lid, if the base material costs \$0.20 per square centimetre, and the sides and lid cost \$0.10 per square centimetre. (Recall that 1 litre = 1000 cubic centimetres.)

6. Find the maximum possible volume of a circular cylinder that can be put inside a sphere of radius R.

   Recall that the volume of a cylinder of radius R and height H is $\pi R^2 H$.

   Suggestion: Spend at least 5 minutes on this before asking for the solution.