University of Lethbridge
Department of Mathematics and Computer Science
MATH 1560 - Tutorial #5
Monday, February 12

Student #1 :_____

Student #2 :_____

Student #3 :_____

Student #4 :_____

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

1. Evaluate the limits:

   (a) $\lim_{x\to 0} \sqrt{4x^2 - x + 9}$ (b) $\lim_{x\to\infty} \dfrac{8x^5 + 3x + 5}{4 + 5x^3 + 2x^5}$ (c) $\lim_{x\to 3} \dfrac{x^2 - 9}{x - 3}$

2. Compute the derivative:

   (a) $\dfrac{d}{dx}(x^4 + 4x + 9)$ (b) $\dfrac{d}{dx}\sqrt{x^4 + 4}$ (c) $\dfrac{d}{dx}(5x^3 e^x)$

3. Evaluate the immediate integral:

   (a) $\displaystyle\int (4x^3 + 2x)\, dx$ (c) $\displaystyle\int 7e^{7x} \sin(e^{7x})\, dx$

   (b) $\displaystyle\int \frac{1}{x}\, dx$ (d) $\displaystyle\int \frac{\ln(x)}{x}\, dx$

Test problems: (note $\displaystyle\sum_{k=1}^{n} k^3 = \frac{n^2(n+1)^2}{4}$)

1. Compute the limit:

   (a) $\displaystyle\lim_{x\to 2^+} \frac{(x^2-4)^2}{x-2}$

   (b) $\displaystyle\lim_{n\to\infty} \left(\frac{1^3}{n^4} + \frac{2^3}{n^4} + \cdots + \frac{n^3}{n^4}\right)$

2. Compute the derivative:

   (a) $f(x) = \dfrac{\sin(x)}{e^x}$

   (b) $g(x) = \tan(5x^2)$

3. Compute $\dfrac{d}{dx}(x^x)$

4. Evaluate the integral:

   (a) $\displaystyle\int 2x(x^2+4)^4\,dx$

   (b) $\displaystyle\int (\cos(2x) - sec^2(x))\,dx$

5. Compute $y' = \frac{dy}{dx}$, given:

   (a) $x^2 + y^2 = 25$, at the point $(-3, -4)$.

   (b) $y^3 + x^5 y = 2\ln(y) + \dfrac{x}{y}$ (don't solve for y')

6. Given $f(x) = x^2 e^x$, solve the equation $f'(x) = 0$.

7. Given $f(x) = e^{-2x^2}$, solve the equation $f''(x) = 0$.

8. Let $f(x) = x^3(x-4)^5$. Determine:

   (a) All values of x such that $f'(x) = 0$

   (b) The intervals on which f is increasing or decreasing.

   (c) The coordinates of any local maxima or minima.