List the names of the others in your group, where they are from or which HS they attended, and their major:

1. If you encounter an INDETERMINATE FORM (e.g., $\frac{0}{0}, \frac{\pm\infty}{\pm\infty}, \infty - \infty$ etc.), you must [Circle the correct answer.]

(a). Claim that the limit Does Not Exist (DNE).

(b). Claim that $\dfrac{0}{0} = 1$, $\dfrac{\pm\infty}{\pm\infty} = \pm 1$, or $\infty - \infty = 0$.

(c). Do MORE WORK because the limit is unable to be determined YET.

2. Evaluate the following limits:

(a). $\displaystyle\lim_{x \to 2} \frac{x^2 - 4}{x^2 + x - 6}$

(b). $\displaystyle\lim_{x \to \infty} \frac{x^2 - 4}{3x^2 + x - 6}$

3. Find the derivatives of the following functions. [Do not simplify.]

(a). $s(t) = 3t^4 - 5t^2 + 3$

(b). $f(x) = \dfrac{4x - 3x^2}{2 + 5x}$

(c). $f(x) = x \cos ax$

(d). $xy^2 = 3x + y$ [Find dy/dx using implicit differentiation.]

4. Explain in your own words what the derivative of a function represents.

5. Evaluate the following integrals. [**Note:** You may or may not need to simplify and/or use u-substitution.] Remember that you can check your answer by differentiating the result.

(a). $\displaystyle\int_0^1 x^3 - 3x^2 + 1\, dx$

(b). $\displaystyle\int \sin(3\theta)\, d\theta$

(c). $\displaystyle\int \frac{x^4 + 2x^2}{x^2}\, dx$

(d). $\displaystyle\int (2x+1)(x^2+x)^8 dx$

6. Determine whether the following statements are true or false. Explain why or state the rule.

(a). $\displaystyle\int x \cdot \cos x\, dx = \frac{1}{2}x^2 \cdot \sin x + C$

(b). $\displaystyle\int 3f(x)\, dx = 3\int f(x)\, dx$

(c). $\displaystyle\int xf(x)\, dx = x\int f(x)\, dx$

7. Evaluate the following integral: $\displaystyle\int x^n\, dx$

For which specific value of n can we ***not*** use the above rule?
Try using it in this case and see what happens. Explain anything you notice that indicates why the rule doesn't work in this case.

8. Given $f(x) = \int_1^x 3t^2\, dt$, find $f'(x)$ in 2 ways:

(a). By evaluating the integral to obtain $f(x)$ and then differentiating your result to obtain $f'(x)$.

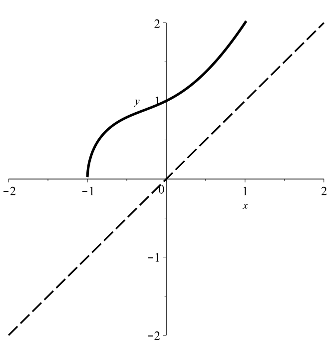
(b). By using Pt. 1 of the Fundamental Theorem of Calculus (p. 322) [Hint: Look at alternate form $\boxed{5}$ on p. 323].

9. Sketch the graph of a function f that satisfies the following conditions.

$f(-3) = -1$, $f(2) = 0$, f has a jump discontinuity at $x = -3$, $\lim_{x\to\infty} f(x) = -4$

$f'(x) = -1$ on $(-\infty, -3)$, $f'(x) > 0$ on $(-3, 2)$, $f'(x) < 0$ on $(2, \infty)$

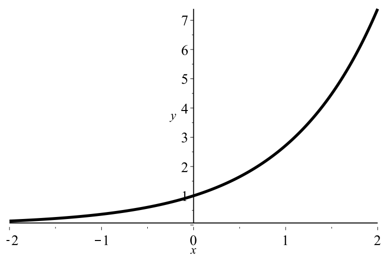
10. Recall (from an algebra or precalculus class) that if an inverse function exists, its graph can be found by reflecting the original function through the line $y = x$. **Sketch the inverse function on the graph below.**



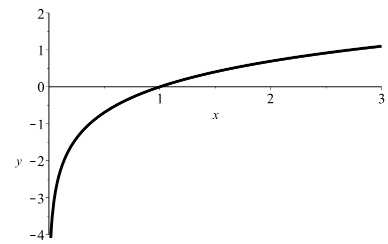
Do you think that the derivative exists for the inverse function? Why or why not?

11. Below are the graphs given for the exponential function $f(x) = e^x$ and the natural logarithmic function $f(x) = \ln x$. Use the graphical techniques of Section 2.2 [See Example 1 and Exercises 3-11] to **sketch** a graph of the derivative for each of the functions. [Do **NOT** look up the derivatives of these functions. We haven't learned them yet. Just use graphical techniques to sketch the derivatives.]

Graph of $f(x) = e^x$



Graph of $f(x) = \ln x$



Sketch a graph of the derivative below.

Sketch a graph of the derivative below.

Note: We will be discussing exponential, logarithmic, and inverse functions in more detail. Recall from your precalculus course that e represents an irrational number, i.e. $e \approx 2.71828\ldots$.

12. Think back to Calculus I – I know this may be hard:) Which concepts do you feel particularly comfortable with and which ones do you feel are still a particular challenge to you?

Sign below to indicate that you have read the syllabus and understand the policies for this class.

Signature: ______________________________ **Date:** ______________