Some Skills from Calculus to Review

Math 374 builds on your knowledge of material from your previous math courses, especially integral calculus. Here are some topics to review because they will come up again this semester.

1. Derivative and integral calculations: What does the chain rule say? How do you use the chain rule when you do integration by substitution? How do you do integration by parts? For which integrals is that a useful integration technique? How do you do integrals by partial fractions? For which integrals is that a useful integration technique? Be able to take derivatives of $e^{4x^2}, sin(3x), cos(3x), \frac{\ln(1+x^4)}{x^2+3}$, and $sin(x-2)+x^3-5^x$ and integrate $x^2+3x-2, \frac{1}{x}, \frac{x+4}{x^2+4x-5}, \frac{1}{x^2-5x+9}, \frac{x}{x^2-5x+9}, \cos(x)e^{\sin(x)}$, and $x\ln(x)$.

2. Derivative as the slope of a tangent line: Consider the function $f(x) = \ln(2+\sin(x))$. What is the derivative of f? What is the derivative of f at $x = \pi$? What is the equation of the tangent line to f at $x = \pi$? Use this equation to approximate f when $x = \pi - .01$.

3. Integral as a solution to a differential equation: How many functions solve the equation $\frac{df}{dx} = e^{3x}$? Write a formula for all of them. Write a formula for all functions that also satisfy the equation $f(2) = \pi$.

4. Taylor series as another way to write a function: What is the Taylor series centered at 0 for $sin(x), cos(x)$, and e^x? Where do these series converge? When does they give the value of the function? What is the Taylor series for $\log(x)$ centered around 1? Where does it converge? When does it give the value of the function?