Test 1 - Calculus II (Spring 2016)

INSTRUCTIONS: Complete each of the following problems in your Bluebook. Each problem is worth a maximum of 12 points. Points will be awarded for both completeness and clarity of solutions. Partial credit will be awarded for partial solutions. Please recall that **cell phones and graphing calculators are not allowed on this exam.**

1. Compute $\int_0^8 \frac{1}{x^{1/3}} dx$, or show that the integral diverges.

2. Compute $\int_0^1 x\cos(\pi x)dx$.

3. Compute $\int \cos^{498} x \sin^3 x dx$.

4. Compute $\int \frac{-100}{x^3+25x} dx$.

5. Compute $\int \frac{8}{x^3\sqrt{x^2-4}} dx$.

BONUS. (+6 points) Let $p > 1$ and let $q = \frac{1}{p}$. Prove that $\int_1^\infty \frac{1}{x^p} dx + 1 = \int_0^1 \frac{1}{x^q} dx$.