Math 106 Midterm Exam #2 March 22, 2017

• This is a closed-book examination. No books, notes, calculators, cell phones, communication devices of any sort, webpages, or other aids are permitted.

• Simplify numerical answers such as $\sin\left(\frac{\pi}{6}\right)$ and $4^{\frac{3}{2}}$.

• Please *show* all of your work and *justify* all of your answers. (You may use the backs of pages for additional work space.)

1. [22 Points] Compute $\int_{-1}^{3} 4 - 3x - x^2 \, dx$ using two different methods:

(a) Fundamental Theorem of Calculus

(b) Limit Definition of the Definite Integral.

2. [4 Points] Compute $g'(x)$ where $g(x) = \int_{x}^{3} \frac{\sqrt{1+t}}{7+\sec^2 t} \, dt$.

3. [32 Points] Evaluate each of the following integrals. Simplify.

(a) $\int_{\frac{\pi}{6}}^{\frac{\pi}{4}} \frac{\sin x}{\cos^3 x} \, dx$

(b) $\int_{1}^{4} \frac{1}{\sqrt{x}\ (3+\sqrt{x}\ )^2} \, dx$

(c) $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \tan^3 x \ \sec^2 x \, dx$

(d) $\int_{0}^{\frac{\pi}{3}} \sec x \tan x \ \sqrt{8 - 4\sec x} \ dx$

4. [32 Points] Evaluate each of the following integrals. Simplify.

(a) $\displaystyle\int_1^9 \frac{(1+x^2)(1-\sqrt{x})}{x^2}\,dx$

(b) $\displaystyle\int \frac{6}{x^3\sqrt{1+\dfrac{6}{x^2}}}\,dx$

(c) $\displaystyle\int x\,(8-x)^{\frac{1}{3}}\,dx$

(d) $\displaystyle\int x^6\,\left(8-x^7\right)^5\,dx$

5. [10 Points] Compute $\displaystyle\int_{-1}^{4} |2x-4|-1\,dx$