Math 111, Section 01, Fall 2012

Worksheet 10, Thursday, November 29, 2012

1. Compute $g''(x)$ when $g(x) = \int_{\tan x}^{7} \sqrt{e^t + 3}\, dt$.

2. Compute $f'(x)$ where $f(x) = \sqrt{\cos(x^2 + e^x)} + \cos\sqrt{x^2 + e^x} + e^{\sqrt{x^2 + \cos x}}$.

3. Compute the area bounded between $y = e^x,\ y = e^{-x}$ and $x = 2$.

4. Compute each of the following integrals:

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

(b) $\int \frac{1}{\sqrt{x}(1+\sqrt{x})^9}\, dx$

(c) $\int x\sqrt{x+1}\, dx$

(d) $\int \frac{(1+e^x)^2}{e^x}\, dx$

(e) $\int_1^9 \sqrt{2x+7}\, dx$

(f) $\int (e^x + e^{-x})^2\, dx$

5. Find a function $f(x)$ that satisfies $f'(x) = x^2\sin(x^3)$ and $f(0) = 3$.

6. A ball is thrown straight **down** from the top of a building at 96 feet per second. The ball hits the ground after 1 second. How tall is the building?

7. Compute $\int_2^5 x^2\, dx$ using each of the following two different methods:

(a) Fundamental Theorem of Calculus

(b) Riemann Sums and the limit definition of the Definite Integral.

8. Consider the right triangle with sides 6, 8, 10. Inside this triangle, we inscribe a rectangle such that the corner of the rectangle is the right angle of the triangle and the opposite corner of the rectangle lies on the hypotenuse. What is the maximum possible area of the rectangle?

Hint: Draw the diagram and find the (fixed) equation of the line along the hypotenuse of the triangle. Or you could use similar triangles to get this equation.

Can you pick off the common sense bounds or domain right from your diagram?

Turn in your own solutions.