Math 131 - April 25, 2016
Solutions

Warm-up Problems

1. Find an explicit formula (without an integral) for the following integral functions. (Make sure you understand how and why these are functions of x.)

   (a) $g(x) = \int_1^x \sin t \, dt = -\cos x + \cos 1$

   (b) $g(x) = \int_1^x \cos t \, dt = \sin x - \sin 1$

   (c) $g(x) = \int_1^{x^2} \cos t \, dt = \sin x^2 - \sin 1$

   (d) $g(x) = \int_1^x \frac{1}{t} \, dt = \ln x$

   (e) $g(x) = \int_3^x \frac{1}{t} \, dt = \ln x - \ln 3$

   (f) $g(x) = \int_3^{x^2+4} \frac{1}{t} \, dt = \ln(x^2+4) - \ln 3$

   (g) $g(x) = \int_x^{x^2+4} \frac{1}{t} \, dt = \ln(x^2+4) - \ln x$

2. For each of the integral functions in Problem 1, compute $g'(x)$.

Lecture Problems

3. Compute the derivative of these functions.

   (a) $\frac{d}{dx} \int_1^x \sin(t^2) \, dt = \sin x^2$

   (b) $\frac{d}{dx} \int_x^1 \sin(t^2) \, dt = -\sin x^2$

   (c) $\frac{d}{dx} \int_x^x \sin(t^2) \, dt = 0$

   (d) $\frac{d}{dx} \int_1^{x^2} \sin(t^2) \, dt = 2x \sin(x^4)$

   (e) $\frac{d}{dx} \int_x^{x^2} \sin(t^2) \, dt = 2x \sin(x^4) - \sin(x^2)$