Homework 1

Sections 7.1 & 7.2
Due: 1-28-14

1. Suppose that f is a continuous function, defined for all x, and that the values of the following integrals are known:

$$\int_0^1 f(x)\ dx = 5; \quad \int_{-1}^1 f(x)\ dx = 3; \quad \int_0^2 f(x)\ dx = 8; \quad \int_0^4 f(x)\ dx = 11.$$

   Evaluate the following integrals:

   (a) $\displaystyle\int_0^2 f(2x)\ dx$,

   (b) $\displaystyle\int_0^\pi \sin(x) f(\cos(x))\ dx$,

   (c) $\displaystyle\int_2^3 x f(8 - x^2)\ dx$.

2. Compute $\displaystyle\int \ln(x^2 + 1)\ dx$.

   Hint: $1 - \frac{1}{x^2+1} = \frac{x^2}{x^2+1}$.

3. Compute $\displaystyle\int \sin^2(x)\ dx$.

   Hint: Use integration by parts first, then use the identity $\cos^2(x) = 1 - \sin^2(x)$.