Homework #5

Due Monday, November 15

1. Find the following antiderivatives.

   (a) $\int (2x^3 - 3x^{\frac{1}{2}} + 7y^2 - 23 + xy)dx$

   (b) $\int (e^{2x} - \frac{2}{x} + 8bx - \frac{2x^2}{\sqrt{x}})dx$

2. Apply integration by parts to the following problems.

   (a) $\int x \sin(x)dx$

   (b) $\int x^3 \log(5x)dx$

3. Evaluate the following definite integrals.

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

   (b) $\int_{-1}^{1} \frac{\sin(x)}{1 + x^2 + x^4}dx$

   (c) $\int_{2}^{3} 18x^2 \sqrt[4]{6x^3 + 5}dx$

   (d) $\int_{5}^{10} \left(1 - \frac{1}{x}\right) \cos(x - \log(x))\, dx$

4. Show:

   (a) If $a < b$, then $\int_a^b f(x)dx = \int_a^b f(a + b - y)dy$

   (b) If $\int_0^\infty f(x)dx < \infty$, then $\int_0^\infty f(x)dx = \int_0^\infty \frac{f(1/y)}{y^2}dy$.

   Hint: find the right substitution and recall that $\int_a^b f(x)dx = -\int_b^a f(x)dx$.