

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

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

(c) $\int_2^3 18x^2 \sqrt[4]{6x^3 + 5} dx$

(d) $\int_5^{10} (1 - \frac{1}{x}) \cos(x - \log(x)) dx$

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 $\int_a^b f(x) dx = -\int_b^a f(x) dx$.