Warm-up Problems - February 22, 2006
Solutions

1. Find the average value of \( f(x) = x^2 \) over the interval [1, 3]. (What is the formula for average value?) Solution:

\[ f_{\text{ave}} = \frac{1}{3-1} \int_1^3 x^2 \, dx = \frac{1}{2} \left( \frac{26}{3} \right) = \frac{13}{3} \]

Lecture Problems

2. Set up the integrals and integrate both ways (x first y second, then do y first and then x).

(a) \( R = \{(x, y) : 1 \leq x \leq 4, -1 \leq y \leq 0\} \)

\[ \int \int_R 3x + y \, dA \]

Solution: 21

(b) \( R = \{(x, y) : -1 \leq x \leq 4, -2 \leq y \leq 1\} \)

\[ \int \int_R 3x^2y^2 \, dA \]

Solution: 195

3. Find the average value of the functions over the rectangles in Problem 2.

Solution:

(a) \( f_{\text{ave}} = \frac{21}{(3)(1)} = 7 \)

(b) \( f_{\text{ave}} = \frac{195}{(5)(3)} = 13 \)