

December 3, 2002

Show all work for credit.

Leave all answers as exact answers unless otherwise stated.

1. Evaluate  $\int_{-2}^2 (5x^4 - 3x^2)dx$  using the Fundamental Theorem of Calculus.

2. Use the Fundamental Theorem of Calculus to prove that if  $f$  is an even function, and  $f$  is continuous on the interval  $[-a, a]$ , then  $\int_{-a}^a f(x)dx = 2F(a)$ .

Hint: If  $f$  is even, then  $f(-x) = f(x)$ . If  $f$  is odd, then  $f(-x) = -f(x)$ .

Hint 2: The derivative of an odd function is even.

3. (Bonus) Evaluate  $\frac{d}{dx} \int_a^b \sin(x^2 + 3x - 15)dx$