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Quiz 6, Calculus I

Dr. Graham-Squire, Spring 2013

Name: Key

1. (4 points) Find the indefinite integral (i.e. the most general antiderivative).

$$\int \left(\cos x + \frac{x^2}{x^5}\right) dx$$

$$= \int \left(\cos x + x^{-3}\right) dx$$

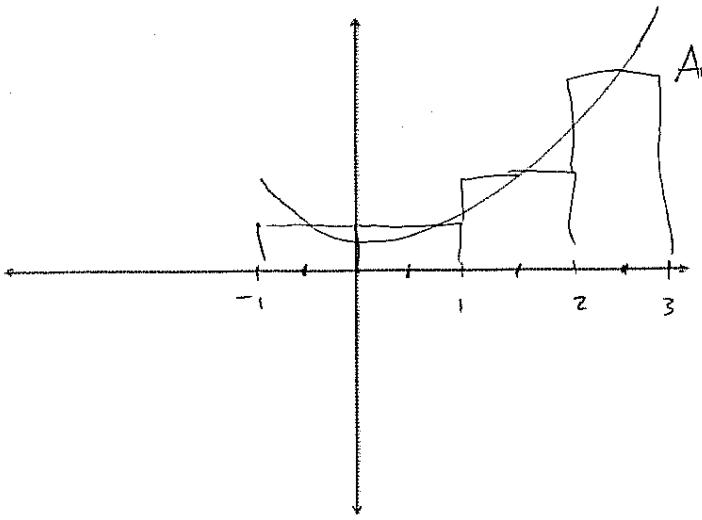
$$= \sin x + \frac{x^{-2}}{-2} + C$$

$$= \sin x - \frac{x^{-2}}{2} + C$$

$$= \sin x - \frac{1}{2x^2} + C$$

2. (5 points) Use a Riemann sum with four subintervals evaluated at the midpoint (that is, calculate M_4) to approximate the value of

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



$\Delta x = 1$

Area $= 1\left(f(0.5) + f(\frac{1}{2}) + f(\frac{3}{2}) + f(\frac{5}{2})\right)$

$= 4(\frac{-1}{2})^2 + 1 + 4(\frac{1}{2})^2 + 1 + 4(\frac{3}{2})^2 + 1 + 4(\frac{5}{2})^2 + 1)$

$= 1 + 1 + 1 + 1 + 9 + 1 + 25 + 1$

$= \boxed{40}$

3. (1 point) Use an antiderivative to calculate the exact value of $\int_{-1}^{3} (4x^2 + 1)\, dx$.

$$\int_{-1}^{3} (4x^2 + 1)\, dx = \frac{4}{3}x^3 + x \Big|_{-1}^{3}$$

$$= \frac{4}{3}(3)^3 + 3 - \left(\frac{4}{3}(-1)^3 - 1\right)$$

$$= 36 + 3 + \frac{4}{3} + 1 = \boxed{41.\overline{3}}$$