Fall '04/MAT 250/Quiz 5, take-home **Name:** Solution *Show all your work.*

The rules: you may use your book and notes on this take-home quiz. Your work is to be entirely your own: you may not talk to anybody else about the quiz problems. Turn the quiz in on Monday, Dec. 6th.

1. (5pts) Find f if $f'(x) = x^2(4x - \sqrt{x})$ and $f(1) = 3$.

$f'(x) = 4x^3 - x^2\sqrt{x}$

$= 4x^3 - x^{\frac{5}{2}}$

$f(x) = x^4 - \frac{2}{7}x^{\frac{7}{2}} + C$

$3 = f(1) = 1 - \frac{2}{7} + C$

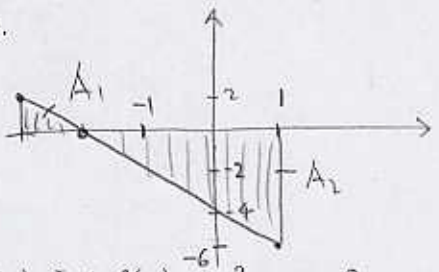
$\frac{16}{7} = C$

$f(x) = x^4 - \frac{2}{7}x^{\frac{7}{2}} + \frac{16}{7}$

2. (4pts) Write the sum in sigma notation:

$1 + 3 + 9 + 27 + 81 + 243 + 729 = 3^0 + 3^1 + 3^2 + \ldots + 3^6 = \sum_{i=0}^{6} 3^i$

3. (4pts) Use the "area" interpretation of the integral to find $\int_{-3}^{1} -2x - 4\,dx$. Draw a picture.



$\int_{-3}^{1} -2x-4\,dx = A_1 - A_2 = \frac{1}{2}\cdot 1\cdot 2 - \frac{1}{2}\cdot 3\cdot 6$

$= 1 - 9 = -8$

4. (7pts) Let $f(x) = x^2 - x - 2$.

a) Find the Riemann sum for f on $[-1, 4]$ using 5 subintervals and midpoints as sample points.

b) Draw the graph of the function with the appropriate rectangles (big and beautiful, okay?) and state what the Riemann sum in a) represents.

a)

sample points.

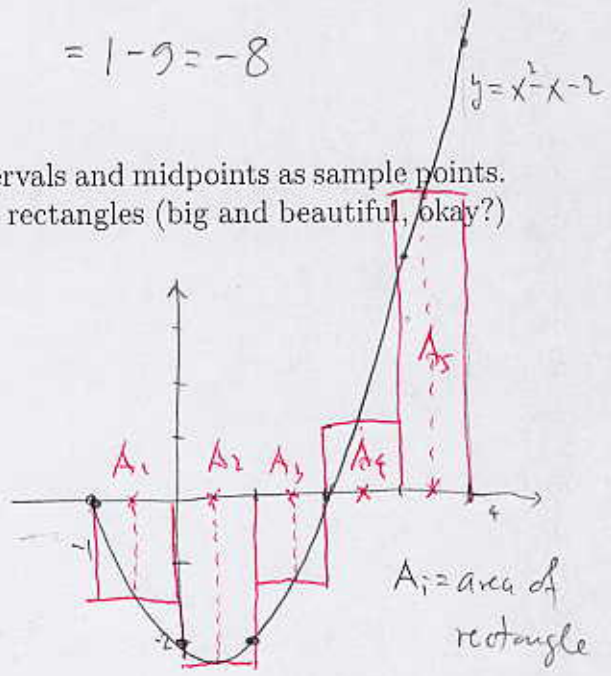
$\sum_{i=1}^{5} f(x_i^*)\,\Delta x =$

$\left(f(-0.5) + f(0.5) + f(1.5) + f(2.5) + f(3.5)\right)\cdot 1$

$= \left(-1.25 + (-2.25) + (-1.25) + 1.75 + 6.75\right)$

$= 3.75$

b)



A_i = area of rectangle

Riemann sum is $-A_1 - A_2 - A_3 + A_4 + A_5$