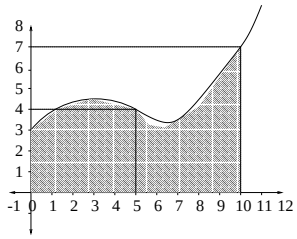
Math 125 Autumn 2002 **Quiz #1 Solutions Sketch**

1. (3 points) Consider the sketch of the graph $y = f(x)$ to find the following estimates for the area below the curve and between $x = 0$ and $x = 10$:



(a) R_2 (The estimate with two rectangles using right endpoints).

ANS: 55.

(b) L_2 (The estimate with two rectangles using left endpoints).

ANS: 35.

(c) M_1 (The estimate with one rectangle using midpoints).

ANS: 40.

(d)(Extra credit.)(2 points) Find $R_{100} - L_{100}$.

ANS: $\frac{10}{100}(7-3) = .4$.

2. (3 points) Consider the following limit of a Riemann sum: $\lim_{n\to\infty} \frac{\pi}{n} \sum_{i=1}^{n} \cos(i\frac{\pi}{n})$.

(a)(2 points) Write this limit as a definite integral.

ANS: $\int_0^{\pi} \cos(x)dx$.

(b)(1 points) Sketch a graph of the region with net area equal to the limit.

ANS: Cosine function from 0 to π. The net area is 0.

3. (4 points) You are driving and hear a loud bang from your engine. At that moment your car starts to lose power and the acceleration for the next minute is $(8-6t)\ \frac{\text{furlongs}}{(\text{minute})^2}$ where t is the time in minutes after the bang.

(a) (2 points) Find an equation for the position of your car as a function of time. (This equation may involve constant parameters.)

ANS: $s(t) = -t^3 + 4t^2 + Ct + D$ furlongs.

During the minute after the bang your car travels 10 furlongs.

(b)(2 points) How fast is your car going one minute after the bang occurred?

ANS: $10 = s(1) - s(0) = 3 + C$ so $C = 7$ and $v(t) = -3t^2 + 8t + C$ so $v(1) = 12\ \frac{\text{furlongs}}{\text{minute}}$.