NAME: Solution

HOMEWORK FOR WORKSHEET 4 **MATH 1300** **DUE February 8, 2008**

Definition. The *average rate of change* of a function f over an interval $[a, b]$ is defined by the expression:

$$\frac{f(b) - f(a)}{b - a}.$$

1. The first problem on Worksheet 4 described Amy's drive from Boulder to Summit county: Due to road construction, Amy drove the first 10 miles at a constant speed of 20 mph. For the next 40 miles she maintained a constant speed of 60 mph and then stopped at Starbuck's for 10 minutes to buy her third skinny, grande latte of the morning. She then drove the next 45 miles at a constant speed of 45 mph.

Let $f(t)$ denote Amy's distance from Boulder as a function of time t in hours. Find the average rate of change of $f(t)$ over the time interval $t = 0$ to $t = 2\frac{1}{3}$.

$$\text{Ave rate} = \frac{f(7/3) - f(0)}{7/3 - 0} = \frac{95}{\frac{7}{3}} = \frac{285}{7}$$

$$\approx 41 \text{ mph}$$

2. The owners of a flour mill estimate that it costs them

$$C(x) = 500 + 2x^{2/3} + (x/50)$$

dollars to produce x pounds of flour per day. Find the average rate (per pound) at which their cost is changing if they increase their daily production from $x = 27000$ pounds to $x = 64000$ pounds.

$$\text{Ave rate} = \frac{C(64000) - C(27000)}{64000 - 27000}$$

$$= \frac{4980 - 2840}{37000} \approx \$.0578/\text{lb}.$$