Math 111.01 Summer 2003
In Class Exercise (June 27, 2003)

Example: Exercise #1 on page 99. A tank holds 1000 gal of water which drains from the bottom in 30 minutes

after t min	5	10	15	20	25	30
vol V remaining	694	444	250	111	28	0

(a) If $P = (15, 250)$ is on the graph of $V(t)$, find the slope of the secant lines PQ when Q is the point $(t, V(t))$, $t = 5, 10, 20, 25, 30$.

$$(5, 694), \ m = \frac{694 - 250}{5 - 15} = -44.4$$

$$(10, 444), \ m = \frac{444 - 250}{10 - 15} = -38.8$$

$$(20, 111), \ m = \frac{111 - 250}{20 - 15} = -27.8$$

$$(25, 38), \ m = \frac{38 - 250}{25 - 15} = -22.2$$

$$(30, 0), \ m = \frac{30 - 250}{0 - 15} = -14.\overline{6}$$

(b) Estimate the slope of the tangent line at P by averaging the slopes of the two adjacent secant lines.

$$\text{secant 1: } (10, 444) \text{ to } (15, 250): \text{ slope} = -38.8$$
$$\text{secant 2: } (20, 111) \text{ to } (15, 250): \text{ slope} = -27.8$$

average $= -33.3$

(c) Use a graph to estimate the slope of the tangent line at P.

(1) STAT $\rightarrow$ 1:Edit (enter t in L_1, V in L_2)

(2) 2nd [STAT PLOT] 1:Plot1. ENTER. Choose ON. ENTER.

(3) Set window $[5, 30] \times [0, 694]$.