Key

Quiz 2

Show *all* your work. No credit is given without reasonable supporting work. There are *two* sides to this quiz.

1. In a certain state the maximum speed permitted on freeways is 65 mi/h and the minimum is 40. The fine F for violating these limits is \$15 for every mile above the maximum or below the minimum.

   (a) [1] (§2.1 #69b) Find $F(30)$. 30 mi/hr is 10 mi/hr below the min (+.5)

   => fine is $10 \cdot 15 = \$150$ (+.5)

   (b) [2] (§2.1 #69b) Complete the expressions in the following piecewise defined function, where x is the speed at which you are driving. (+.5)

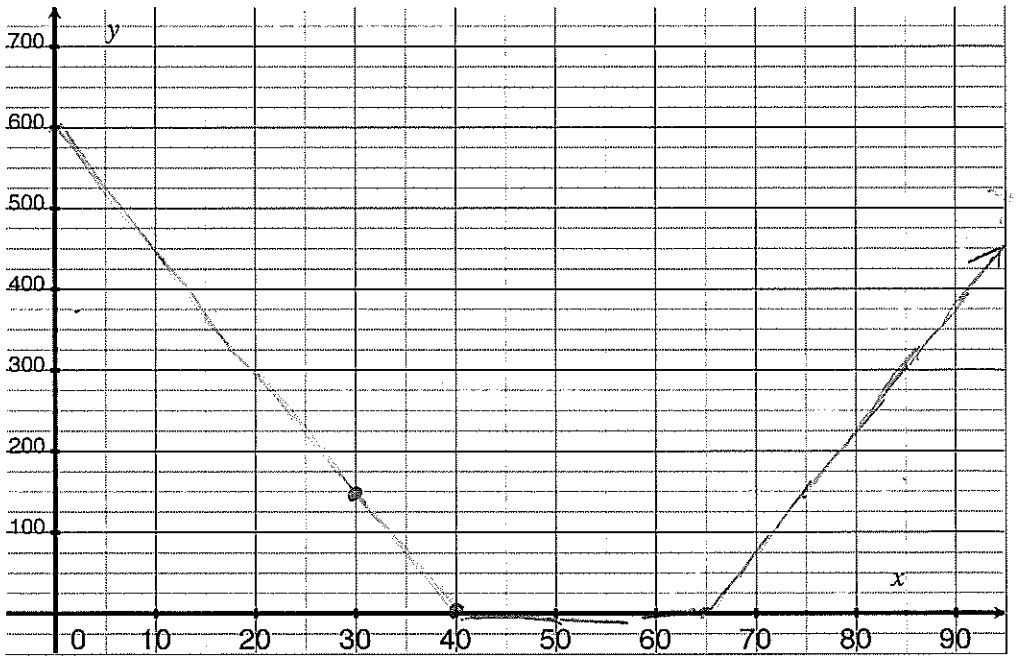
   $$F(x) = \begin{cases} 15(40-x) & \text{if } 0 \le x < 40 \\ 0 & \text{if } 40 \le x \le 65 \\ 15(x-65) & \text{if } 65 < x \end{cases}$$

   got it (1.5) b/c (40-x) is the mi/hr below min

   (+.5) b/c legal

   got it (+.5) b/c x-65 is the mi/hr over the speed limit.

   (c) [2] (§2.2 #43) Sketch the graph of the piecewise defined function F you described above in (b).



shape (5)

F(0) = 15·40 = 600

(+.5) (+.5) (+.5)

2. ~~[3]~~ Let $f(x) = \frac{1}{x}$.

(a) [1] (§2.7 #1) Find $f + f$ and its domain.

$(f+f)(x) = \frac{1}{x} + \frac{1}{x} = \frac{2}{x}$ (+.5)

domain: all real #'s but 0 (+.5)

or $(-\infty, 0) \cup (0, \infty)$

(b) [1] (§2.7 #20) Find $(f \circ f)(3)$.

$(f \circ f)(3) = f(f(3)) = f\left(\frac{1}{3}\right) = \frac{1}{\frac{1}{3}} = 3$ (+.5) (+.5)

(c) [1] (§2.7 #45) Find a function m so that $(f \circ m)(x) = \frac{1}{2x+5}$.

try $m(x) = 2x+5$ (+.5)

notice $(f \circ m)(x) = f(m(x)) = f(2x+5) = \frac{1}{2x+5}$ ✓

composition idea (+.5)

(d) [2] (§2.4 #29) Write the equation for the final transformed graph of g if the graph of g looks exactly like the graph of f but shifted 3 units to the left and stretched vertically by a factor of 5.

(+.5) (+.5) (+.5)

$g(x) = 5f(x+3)$ graph transformation (+.5)

or

$= 5\frac{1}{x+3} = \frac{5}{x+3}$