

p154 #18. Note: only attempt once p153 #8 is complete.

Recall:  $\text{average speed} = \left| \frac{\Delta \text{displacement}}{\Delta \text{time}} \right|$  or  $\frac{\Delta \text{distance}}{\Delta \text{time}}$

Let  $C(v)$  be cost (\$) for the entire trip with an average speed  $v$  of the truck (km/h).

Now, the entire time (h) spent on the trip is  $\frac{450}{v}$ .

Thus,

$$C(v) = 35 \cdot \frac{450}{v} + 15.50 \cdot \frac{450}{v} + \text{fuel cost.}$$

$\uparrow$   $\uparrow$   $\uparrow$   $\uparrow$   
 \$35 per hour wage   # hours   fixed costs per hour   # hours

Now, it says the truck has ~~an~~ fuel efficiency of 8 km per L of fuel, when the speed is 110 km per h. Since the speed is ever changing, this fuel efficiency is variable, too.

The fuel cost is \$1.15  $\times$  #L fuel for the trip.

To find #L fuel:

$$\text{fuel efficiency} = [8 - 0.10(\underbrace{v-110}_{\text{speed difference (km/h)}})] \text{ km per L.}$$

$$\text{Now, } \frac{\# \text{ km}}{\# \text{ km per L}} = \# \text{ L}$$

$$\text{So, } \# \text{ L fuel} = \frac{450}{8 - 0.10(v-110)}$$

$$\text{Thus, } C(v) = 35 \cdot \frac{450}{v} + 15.50 \cdot \frac{450}{v} + \left. \begin{matrix} \# \text{ per L} \\ \uparrow \\ 1.15 \cdot \frac{450}{8 - 0.10(v-110)} \end{matrix} \right\} \# \text{ L}$$

etc! Note:  $v \in (0, \infty)$   $\square$