

36) A small business has weekly average cost of  $\bar{C} = \frac{100}{x} + 30 + \frac{x}{10}$  where  $x$  is the number of units produced each week. The competitive market price for this business's product is 64 \$ per unit. If production is limited to 150 units per week, find the level of production that yields max. profit, and find the max. profit?

$\bar{C} = \frac{100}{x} + 30 + \frac{x}{10}$  , selling price =  $p = 64$  \$  
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$\therefore P(x) = R(x) - C(x)$  ;  $R(x) = px = 64x$

~~$\bar{C} = \frac{C(x)}{x}$~~   $\rightarrow C(x) = \bar{C}x$

$\therefore C(x) = 100 + 30x + \frac{x^2}{10}$

$\rightarrow P(x) = 64x - 100 - 30x - \frac{x^2}{10}$   
 ~~$= 34x - 100 - \frac{x^2}{10}$~~

$P'(x) = 34 - \frac{2x}{10} = 0$

$\frac{34}{-34} - \frac{x}{5} = 0 \rightarrow \frac{-x}{5} = -34$

$-x = -34(5) = -170$

$\therefore x = 170$