7 How many items does the company have to manufacture and sell to not lose money if the revenue function is $R(x) = 200x - 0.25x^2$ and the cost function $C(x) = 40x + 9975$?

to not lose money : $P(x) = 0$

$$P(x) = R(x) - C(x)$$

$$= 200x - 0.25x^2 - 40x - 9975$$

$$= 160x - 0.25x^2 - 9975$$

$a = -0.25$, $b = 160$, $c = -9975$

$$\therefore x = \frac{-b \mp \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-160 \mp \sqrt{160^2 - 4(-.25)(-9975)}}{2(-0.25)}$$

$$= \frac{-160 \mp \sqrt{15625}}{-.5}$$

$$= \frac{-160 + 125}{-.5} \text{ , } \frac{-160 - 125}{-.5}$$

$$= 70 \text{ , } 570$$

$$\therefore 70 \leqslant x \leqslant 570$$