



College Algebra  
 Polynomial Equations Continued; Fundamental Theorem of Algebra

---

d. Find all of the zeros of  $P(x)$ .

We know from the graph in part (b) that there is another zero at the point  $x = -1$ . We can use this value of  $x$  to divide the quadratic factor from part (c).

$$\begin{array}{r}
 -1 \ ) \quad -0.1 \quad 9.8 \quad 9.9 \\
 \underline{\phantom{-1} \quad -0.1 \quad -9.9} \\
 -0.1 \quad 9.9 \quad 0
 \end{array}$$

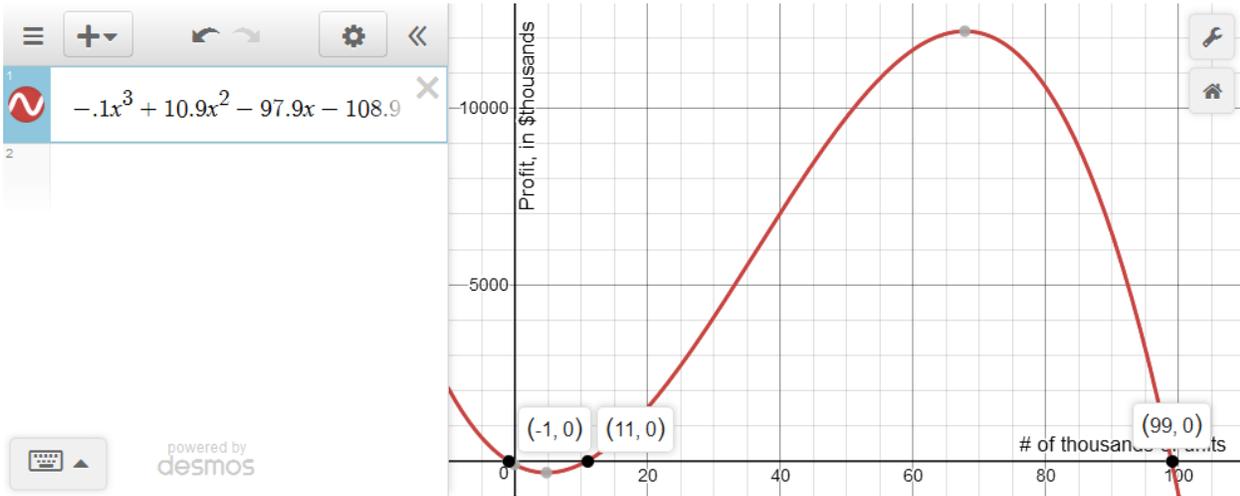
The linear factor, shown in the bottom row of the synthetic division, is  $-0.1x + 9.9$  and we can rewrite  $P(x)$  as follows:  $P(x) = (x - 11)(x + 1)(-0.1x + 9.9)$ .

Setting this last linear factor equal to zero, we get

$$\begin{aligned}
 -0.1x + 9.9 &= 0 \\
 -0.1x &= -9.9 \\
 x &= 99
 \end{aligned}$$

The zeros of  $P(x)$  are  $x = -1$ ,  $x = 11$ , and  $x = 99$ .

This can be verified by expanding the viewing window and looking at the  $x$ -intercepts of the graph.



e. Determine the levels of production and sale that give break-even.

Omitting the negative value of  $x$  (because we can't produce and sell less than zero units), the level of production and sale that result in break-even are 11 units and 99 units.