

College Algebra, Section 3.2, #66
Solving Quadratic Equations

Break-Even The profit for Coffee Exchange coffee beans is given by $P(x) = -15x^2 + 180x - 405$ thousand dollars, where x is the number of tons of coffee beans produced and sold. How many tons give break-even (that is, give zero profit) for this product? ¹

Additional instructions are given to solve this problem analytically and then check graphically.

We're asked to find when the profit is zero. The profit is represented by P so we'll let $P(x) = 0$ and solve for x which gives the number of tons of coffee.

$$P(x) = -15x^2 + 180x - 405$$

$$0 = -15x^2 + 180x - 405$$

$$0 = x^2 - 12x + 27$$

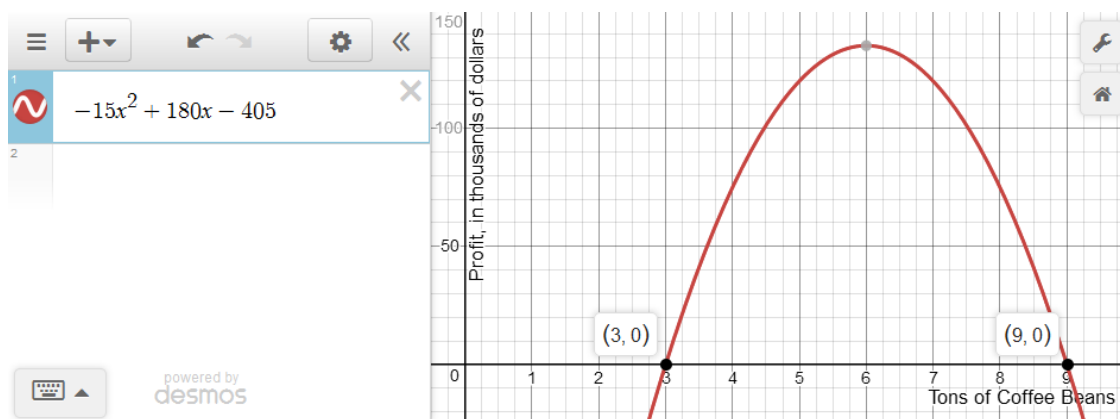
$$0 = (x - 9)(x - 3)$$

$$x - 9 = 0 \text{ or } x - 3 = 0$$

$$x = 9 \text{ or } x = 3$$

The number of tons of coffee that give zero profit are either 3 tons or 9 tons.

To check graphically, we'll graph $P(x) = -15x^2 + 180x - 405$ and look for the x -intercepts. These are the points, (x, P) , where the profit is zero.



The x -intercepts are $(3, 0)$ and $(9, 0)$ so number of tons of coffee that give zero profit are either 3 tons or 9 tons.

¹Harshbarger/Yocco, *College Algebra In Context*, 5e, p. 195, #66.