# Exercise 105

A family bakery makes cupcakes and sells them at local outdoor festivals. For a music festival, there is a fixed cost of \$125 to set up a cupcake stand. The owner estimates that it costs \$0.75 to make each cupcake. The owner is interested in determining the total cost $C$ as a function of number of cupcakes made.

a. Find a linear function that relates cost $C$ to $x$, the number of cupcakes made.

b. Find the cost to bake 160 cupcakes.

c. If the owner sells the cupcakes for \$1.50 apiece, how many cupcakes does she need to sell to start making profit? (Hint: Use the INTERSECTION function on a calculator to find this number.)

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**Solution**

**Part (a)**

The total cost is \$125 plus \$0.75 times the number of cupcakes made.

$$C(x) = 125 + 0.75x$$

**Part (b)**

Since it costs \$0.75 to make each cupcake, it costs

$$0.75(160) = \$120$$

to bake 160 cupcakes.

**Part (c)**

The profit is defined as revenue minus cost.

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

The revenue is \$1.50 times each cupcake. Therefore,

$$P(x) = 1.50x - (125 + 0.75x)$$

$$= 0.75x - 125.$$

To start making a profit, the number of cupcakes the family has to sell is

$$0 = 0.75x - 125$$

$$125 = 0.75x$$

$$x = \frac{125}{0.75} \approx 167.$$