Finite Math
section 1.3 Applications of linear functions

Cost Function $C(x) = ax + b$ (Cost is expenditure)
   $x =$ # items produced, $C = C(x) =$ cost of $x$ items, $a =$ unit cost, $b =$ fixed cost.

Ex1, Let $C(x) = 220x + 8000 =$ manufacturer's cost to produce $x$ bicycles.
   (a) Fixed cost $= C(0) =$
   (b) Unit cost $= $ cost for 1 additional item
      Unit cost $= C(1) - C(0) = \frac{\Delta C}{\Delta x} = \frac{C_2-C_1}{x_2-x_1} = \frac{C(q)-C(p)}{q-p}$
   (c) Find the cost to produce 40 bicycles.
   (d) How many bicycles was produced if the cost was $30,000 ?$

Ex2, Let $C(x) = 35x + 4400 =$ cost to produce $x$ copies of a certain book. Find:
   (a) fixed cost and unit cost
   (b) cost to produce 1000 books
   (c) How many books are produced if the total cost was $14900 ?$

Revenue Function $R(x) = kx$ (Revenue is income)
   where $x =$ # of items sold, $R = R(x) =$ Revenue, $k =$ unit sell price

Ex3, Let $R(x) = 420x$ where $x =$ # bicycles sold, $R =$ Revenue

Ex4, Let $R(x) = 85x$ where $x =$ # of books sold

Profit Function $P(x) = R(x) - C(x)$
Break Even Analysis: Break Even when $P(x) = 0$ (same as $R(x) = C(x)$)
   Break Even means no loss and no profit.

Ex5, Let $C(x) = 220x + 8000 =$ manufacturer's cost to produce $x$ bicycles.
   Let $R(x) = 420x$ where $x =$ # bicycles sold, $R =$ Revenue
   (a) Find profit function.
   (b) Find break even point.
   (c) Profit is $3000$. Find $x$.
   (d) Profit is greater than $5000$.
   (e) Loss is $3000$.
   (f) Loss is greater than $2000$.

Ex6, Let $C(x) = 35x + 4400 =$ cost to produce $x$ copies of a certain book.
   Let $R(x) = 85x$ where $x =$ # of books sold
   (a) Find profit function
   (b) Find break even point.
Ex7, Chloe opens a small donut shop. Her weekly rent costs $550, employee costs $1850, and facility costs $600. The cost for producing each donut is 40 cents. She estimates to produce and sell 4000 donuts every week. Let $a = \text{sell price of each donut.}$

(a) Write and simplify the Profit function.

(b) Find her selling price of each doughnut to break even.
   Set up an equation which describes the problem, then solve the equation.

(c) Find her selling price of each doughnut to generate $2800 profit.
   Set up an equation which describes the problem, then solve the equation.

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Straight Line Depreciation (or Appreciation) \( B(t) = m \ t + n \)

\( B(t) = \text{(book) value of an item after } t \text{ years since new.} \ n = \text{value of new item,} \)
\( m = \text{annual appreciation value (depreciation when } m < 0 \text{ and } |m| = \text{depreciation amount)} \)

Ex8, Let \( B(t) = -3000 \ t + 24000 \) be the book value of a certain car.

Ex9, If the value of a car when 5 years old is $24000, and the value of the same car when 7 years old is $18000, find the value function of the car.

Ex10, If the value of a car when 3 years old is $24000, and the value of the same car when 8 years old is $10000, find the value function of the car.