**Applied Linear Systems Worksheet**

1. Sandy wants to add an additional bathroom onto her new house. She consults with two different contractors. Contractor A says that he charges $5,000 upfront plus an additional $120 per square foot. Contractor B informs her that he charges $8,500 upfront plus an additional $92 per square foot.
2. Write an equation for the cost in dollars of each contractor, *C*, as a function of the bathroom’s square footage, *q*. Let CA be the cost for contractor A and CB be the cost for contractor B.

b. Using the equations you wrote in **part a**,

i. Determine how many square feet the bathroom would have to be in order for the contractors to charge the same amount. Show your work.

ii. How much would that charge be? Show your work.

1. Use your graphing calculator to confirm the solution you found in **part b**. Sketch a graph below. Be sure to label the axes, vertical intercepts, and the intersection point.



1. Sandy wants her bathroom to be 250 square feet. Which contractor should she choose? Show mathematical work to support your answer.
2. Mary Kay has decided she wants a new bathroom in her house too. She has $17,000 to spend on the new bathroom. Which contractor should she choose if she wants the biggest bathroom possible? Show mathematical work to support your answer.
3. While on a stakeout protecting Earth from the scum of the universe, Agent Cooper observed five men in black enter a coffee shop and get three doughnuts and five coffees for $3.30.  Next, three aliens in disguise entered the shop and got four doughnuts and three coffees for $2.75.
   1. Define the variables you will use to model the situation.
   2. Write the system of equations that describes the situation.
   3. Solve the system algebraically AND interpret the solution.
4. **Afghans and Shawls**  Carmella and Walt produce handmade shawls and afghans. They spin the yarn and then weave it. A shawl requires 1 hour of spinning and 1 hour of weaving. An afghan requires 2 hours of spinning and 4 hours of weaving. Together, they spend 8 hours spinning and 14 hours weaving each day. How many of each item can they make daily?
5. Define the variables.
6. Write the system of equations that models the situation.
7. Solve the system algebraically.
8. Interpret the solution in the context of the problem.
9. **Bonus Question:**

Leslie is interested in buying a new car. She compares the cost of owning two cars she likes:

Car A: An $18,000 gas-powered car that gets 20 mi/gal

Car B: A $22,800 hybrid-electric car that gets 50 mi/gal

\*\*For this comparison, assume that the price of gas is $3 per gal.

1. Write a linear equation that models the cost, *CA*, of purchasing Car A as a function of the miles driven, *d*. Use function notation.
2. Write a linear equation that models the cost, *CB*, of purchasing Car B as a function of the miles driven, *d*. Use function notation.
3. Find the number of miles that Leslie needs to drive so that the cost of owning Car A is the same as the cost of owning car B.