APPLICATIONS: LINEAR MODELS: SYSTEMS OF EQUATIONS Using Systems of Linear Equations to compare costs or income:

7. Problem 7 is adapted from OpenStax College Algebra available for download free at https://openstaxcollege.org/files/textbook_version/low_res_pdf/49/EditedCollegeAlgebra-2015-06-05-LR.pdf

Two different long distance telephone carriers (for landline phones) offer the following plans that a person is considering. Company A has a monthly charge of \$20 plus charges of \$.05 per minute for calls. Company B has a monthly fee of \$5 and charges \$.10 per minute for calls.

- a. Find the linear model for the total cost of Company A's plan, using x as the number of minutes of calls per month
- b. Find the linear model for the total cost of Company B's plan, using x as the number of minutes of calls per month
- c. For how many minutes do both plans produce the same cost?
- d. For what interval(s) of minutes does Company A's plan have the lowest cost?
- e. For what interval(s) of minutes does Company B's plan have the lowest cost?
- 8. Thuy is comparing the membership costs at three gyms.

Gym F: \$200 plus \$25 per month Gym G. \$50 per month

- a. Write the cost functions f, g, for membership for each gym as a function of the number of months of membership
- b. On a separate piece of graph paper, graph each function for $0 \le x \le 12$ months. Scale the x axis in months and the y axis so that each box is \$50.
- c. In 2 to 4 complete sentences, compare the costs, analyzing which is gym least expensive over what periods of time.
- 9. Assaf is considering 3 different sales jobs selling networking systems software
 - At FlashNet (F), he has been offered monthly wages consisting of a base salary of \$2500 per month, plus a commission of 6% of his monthly sales
 - At Galaxy Network Solutions (G), he has been offered compensation based only on commission of 10% of his monthly sales with no base salary.
 - At High Speed Networking (H) his salary would be \$4000 per month, with no commission.

a. Write the functions f, g, h for wges at each company based on x = amount of monthly sales

- b. Graph each function.
- c. Algebraically find the points of intersection of each pair of functions.For what values of (x,y) do f and g intersect?For what values of (x,y) do f and h intersect?

For what values of (x,y) do g and h intersect?

- d. Use a highlighter to show on the graph which company offers the highest wages at what levels of sales.
- e. Write 3 to 5 complete sentences analyzing which company offers the highest wages at what level of sales.

