Straight Line Graphs

LLE – Mathematics and Statistics

$$y = mx + c$$

1. Given the straight line function $y = 2x + 5$:
   (a) write down the gradient
   (b) the point where the line crosses the y-axis (the y-intercept), by substituting $x = 0$ and solving for y
   (c) the point where the line crosses the x-axis (the x-intercept), by substituting $y = 0$ and solving for x
   (d) make a sketch of the straight line graph
2. For each of the functions given:
   (a) Rearrange to make y the subject
   (b) Determine whether the function represents a straight line
   (c) For straight lines: write down the value of the gradient, the co-ordinates of where the line crosses the y-axis, and the co-ordinates of where the line crosses the x-axis
   (d) For straight lines: make a sketch of the function
      i. $2y = 6x + 8$
      ii. $y - 2x = 10$
      iii. $xy - 5 = 10$
      iv. $3x + 2y - 8 = 0$
      v. $x^2 - 3y = 6$
      vi. $x^2 - 3y^2 = 6$
      vii. $5x - 8y = 9$

viii. $\frac{2y-x}{5} = x$

ix. $x(3y-1) = 3xy + 4$

3. For each pair of straight lines given below:

   (a) Sketch each pair on a single graph, labeling the points where the lines cross the axes (you will need to determine these).

   (b) Solve them as simultaneous equations.

   (c) The solution to the simultaneous equations is the point where the two lines cross. Label this point on your sketch.

   i. $y = 2x + 3$
      $y = x + 5$

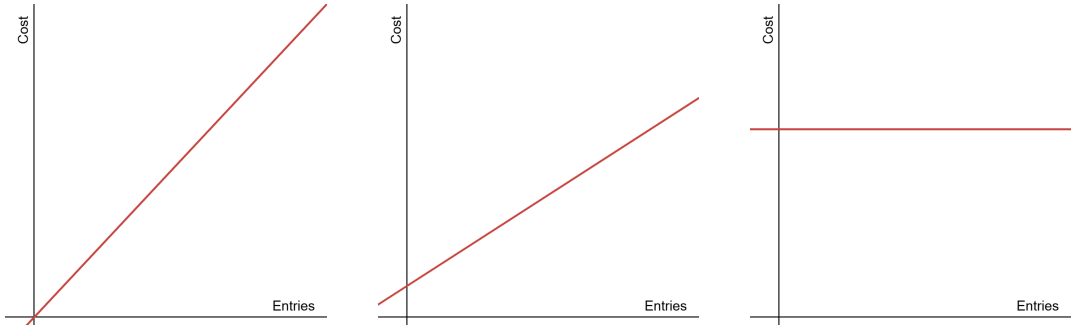
   ii. $x + y = 10$
      $2x - y = 2$

4. Sketch the supply and demand functions given. By solving the equations simultaneously, find the equilibrium price and quantity. For the sketch, place Q on the horizontal axis and P on the vertical axis.

$$\text{Supply: } P = Q + 18$$
$$\text{Demand: } 3Q = 30 - P$$

5. A new gym charges £20 per entry (which gives the user up to 3 hours gym use).

   (a) Which of the graphs below would best represent this?



(b) The manager also considers an alternative pricing structure. They offer a membership price of £20, and thereafter it only costs £12 per entry. Which of the graphs above would best represent this?

(c) For the unselected graph, what would be a suitable scenario for this?

(d) Write down the equation of the line from part a above, using C to represent cost and E to represent entries, with C being the subject of the equation.

(e) Write down the equation of the line, using the same format as d, for the line from part b above.

(f) For each of the two pricing structures, what would be the cost of using the gym on 4 occasions?

(g) If a customer has £100, what is the maximum number of times they can attend the gym, for both pricing structures?

(h) Solve the two equation simultaneously, and comment on what this would mean for the customer.