Math 134 Spring 2018
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Classwork 16 Name: _____

Work on as many problems as you can together with your group members. Towards the end of lecture your group will be asked to present problems correctly to receive classwork points.

1. Find the equation of the line that is parallel to the line $y = 2x - 4$ that passes through the point:

   (a) $(1, 1)$
   (b) $(-1, -1)$
   (c) $(-2, 1)$
   (d) $(1, -2)$
   (e) $(0, 6)$

   Solution The line parallel will have the same slope of $m = 2$. Using point-slope form we get:

   (a) $\boxed{y - 1 = 2(x - 1)}$
   (b) $\boxed{y + 1 = 2(x + 1)}$
   (c) $\boxed{y - 1 = 2(x + 2)}$
   (d) $\boxed{y + 2 = 2(x - 1)}$
   (e) $\boxed{y - 6 = 2x}$

□

2. Given the slope m and the point P, find the equation of the corresponding line as well as the equation of the perpendicular line that passes through the same point P.

   (a) $m = 3, P = (-2, 5)$

   (b) $m = -2, P = (1, 4)$

   (c) $m = -\frac{1}{2}, P = (0, 4)$

   (d) $m = \frac{3}{4}, P = (5, 1)$

   (e) $m = -3, P = (-2, -6)$

   Solution Let m' be the slope of the perpendicular line. Using point-slope form we have:

   (a)
   $$m' = -\frac{1}{3} \text{ and } \boxed{y - 5 = -\frac{1}{3}(x + 2)}$$

   (b)
   $$m' = \frac{1}{2} \text{ and } \boxed{y - 4 = \frac{1}{2}(x - 1)}$$

   (c)
   $$m' = 2 \text{ and } \boxed{y - 4 = 2x}$$

   (d)
   $$m' = -\frac{4}{3} \text{ and } \boxed{y - 1 = -\frac{4}{3}(x - 5)}$$

   (e)
   $$m' = \frac{1}{3} \text{ and } \boxed{y + 6 = \frac{1}{3}(x + 2)}$$

□

3. Graph the given line, as well as the line perpendicular to the given line that passes through the given point P:

   (a) $y = -3x + 6, P = (1, 1)$

   (b) $y = -\frac{1}{2}x + 1, P = (-1, 1)$

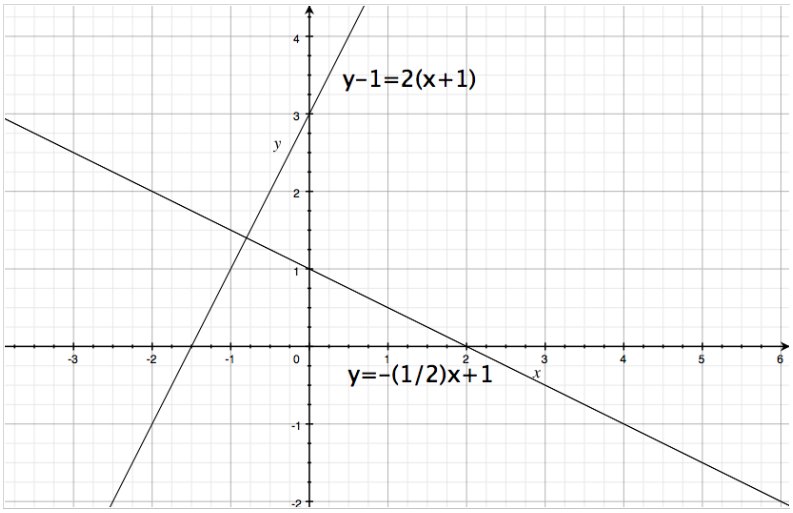
   (c) $y = 2x + 6, P = (-1, 1)$

   (d) $y = -\frac{3}{4}x - 6, P = (0, 6)$

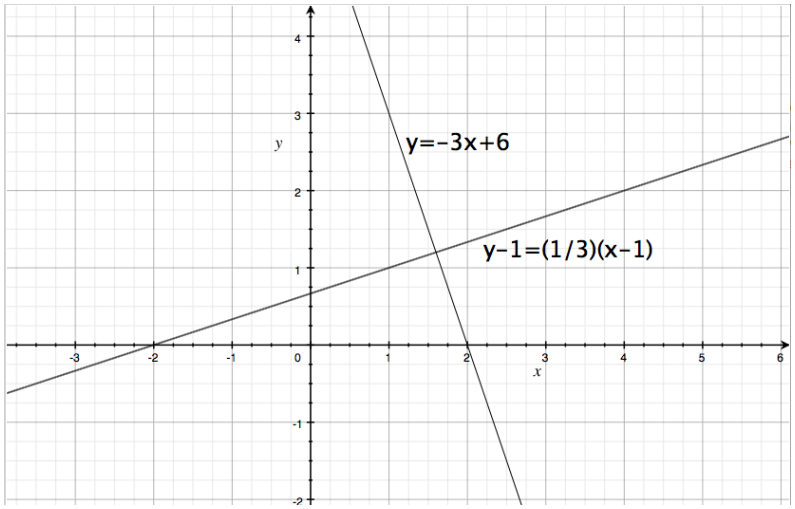
   (e) $y = 5x + 5, P = (-1, 0)$

Solution

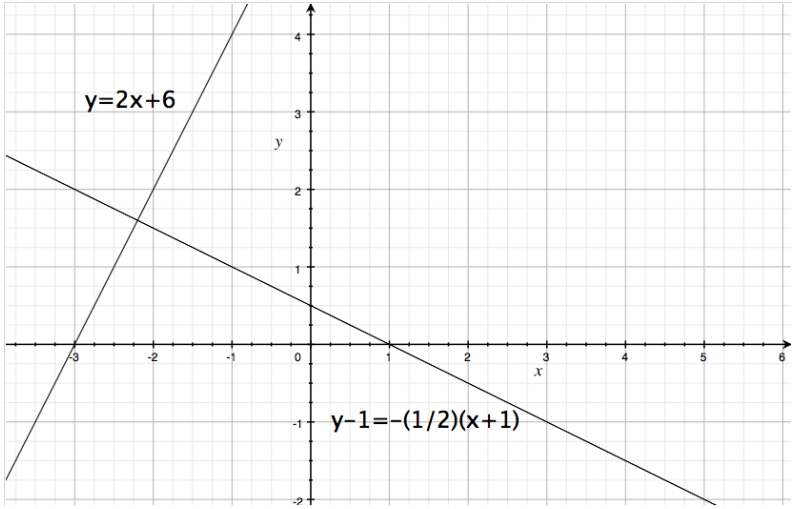
(a)



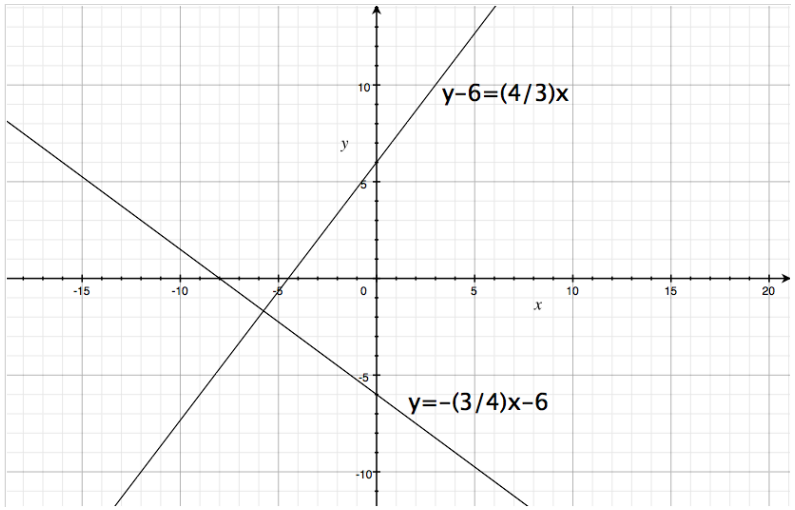
(b)



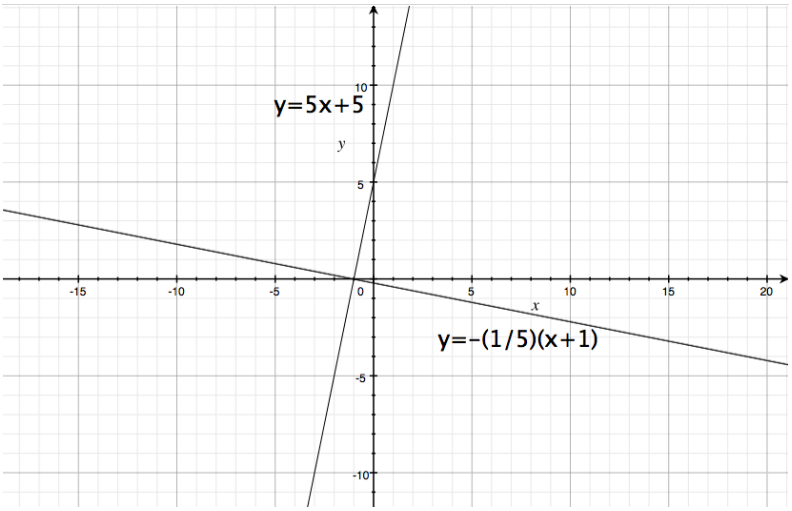
(c)



(d)



(e)



□

4. Find the average rate of change of the function f from x_1 to x_2:

   (a) $f(x) = \sqrt{x}, x_1 = 4, x_2 = 9$

   (b) $f(x) = \frac{1}{x}, x_1 = 2, x_2 = 4$

   (c) $f(x) = x^2 + x + 4, x_1 = 0, x_2 = 2$

   (d) $f(x) = \sqrt[3]{x-1}, x_1 = 9, x_2 = 28$

   (e) $f(x) = 2^x, x_1 = 2, x_2 = 4$

Solution

(a)

$$\begin{aligned}\text{Average Rate} &= \frac{f(9) - f(4)}{9 - 4} \\ &= \frac{\sqrt{9} - \sqrt{4}}{5} \\ &= \frac{3 - 2}{5} \\ &= \boxed{\frac{1}{5}}\end{aligned}$$

(b)

$$\begin{aligned}\text{Average Rate} &= \frac{f(4) - f(2)}{4 - 2} \\ &= \frac{\frac{1}{4} - \frac{1}{2}}{2} \\ &= \frac{\frac{1}{4} - \frac{2}{4}}{2} \\ &= \frac{-\frac{1}{4}}{2} \\ &= \boxed{-\frac{1}{8}}\end{aligned}$$

(c)

$$\begin{aligned}\text{Average Rate} &= \frac{f(2) - f(0)}{2 - 0} \\ &= \frac{(2^2 + 2 + 4) - (4)}{2} \\ &= \frac{10 - 4}{2} \\ &= \boxed{3}\end{aligned}$$

(d)

$$\begin{aligned}\text{Average Rate} &= \frac{f(28) - f(9)}{28 - 9} \\ &= \frac{\sqrt[3]{27} - \sqrt[3]{8}}{19} \\ &= \frac{3 - 2}{19} \\ &= \boxed{\frac{1}{19}}\end{aligned}$$

(e)

$$\begin{aligned}\text{Average Rate} &= \frac{f(4) - f(2)}{4 - 2} \\ &= \frac{16 - 4}{2} \\ &= \boxed{6}\end{aligned}$$

□