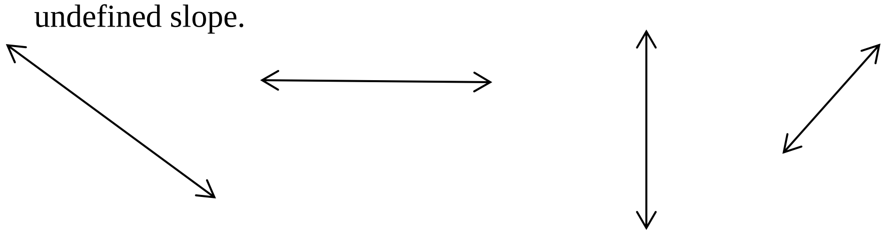
MA 15910 Review for Exam 2, FA 14

1) (a) Find the slope of a line through each pair of points. (b) Find the equation of each line in slope-intercept form. (c) Find the equation of each line in standard form.

A $(5,8)$ and $(-3,-1)$ B $\left(\frac{3}{2},2\right)$ and $\left(-\frac{7}{2},-5\right)$

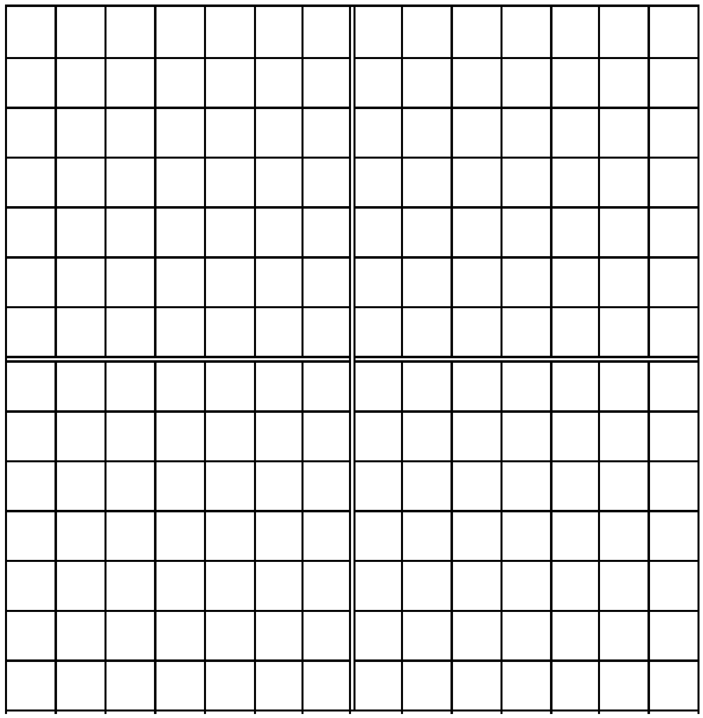
2) Find the equations of a vertical line and a horizontal line through the point (-5, 3).

3) Identify which line has (a) positive slope, (b) negative slope, (c) zero slope, and (d) undefined slope.



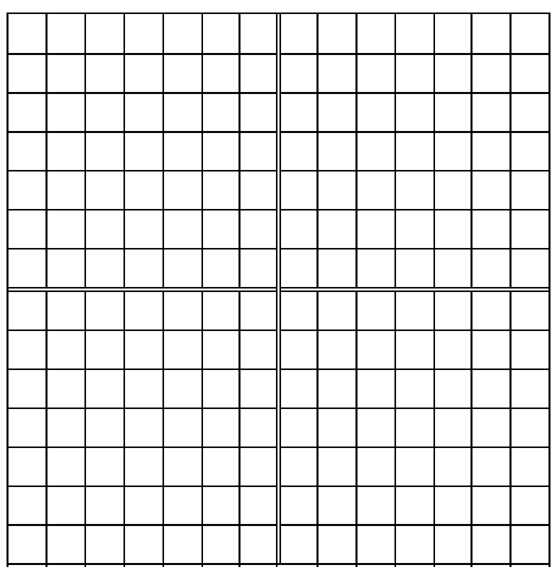
4) Sketch the graph of each line using the slope and a point.

$(a)\quad y = -\frac{3}{4}x + 2$ $\qquad (b)\quad 3x - 5y = -15$



5) Find the *x*-intercept and *y*-intercept of the line and use the intercepts to graph the line.

$2x - 4y = 8$



6) Find the equation of a line with an *x*-intercept of (3, 0) and a *y*-intercept of (0, 2). Write your answer in standard form.

7) Find the equation in slope-intercept form for a line through (-1,6) with a slope of $-\frac{5}{6}$.

8) An athletic club offers a family membership of $165 plus $60 for each additional family member after the first. Let *x* represent the number of additional family members. Write a linear equation in slope-intercept form to represent the membership fee. Use your equation to find the membership fee for a four-person family.

9) In the year 2000 (year 0), the percent of households that had access to high-speed broadband internet service was 9%. By the year 2005 (year 5), the percent of households that had access to high-speed broadband internet service had grown to 37%. This percent has been growing in a linear pattern. (a) Use this information to write 2 ordered pairs and find the slope. (b) Find an equation for the percent in terms of number of years since 2000 (in slope-intercept form). (c) Use your equation to predict what percent of households had high-speed broadband in the year 2010.

10) Complete the table below, then use it to approximate

$$\lim_{x \to -1} f(x), \text{ where } f(x) = \frac{2x^3 + 3x^2 - 4x - 5}{x+1}.$$

x	-1.1	-1.01	-1.001	-0.999	-0.99	-0.9
f(x)						

11) Find the limit values if they exist.

a) $$\lim_{x \to 3} \left(\frac{x^2 + 2x - 15}{x^2 + x - 12} \right)$$

b) $$\lim_{z \to 0} \left(\frac{\frac{-1}{z+2} + \frac{1}{2}}{z} \right)$$

c) $$\lim_{x \to 16} \left(\frac{\sqrt{x} - 4}{x - 16} \right)$$

d) $$\lim_{x \to \infty} \left(\frac{2x^3 - 5x^2 + 9x}{3x^3 - 4x} \right)$$

e) $$\lim_{x \to -\infty} \left(\frac{2x^2 - 5}{3x^3 + 2x} \right)$$

12) Find the average rate of change for each function over the given interval.

$a)$ $y = -4x^2 - 6$ $[2, 6]$ $b)$ $y = \sqrt{3x - 2}$ $[1, 6]$

13) Suppose the position of an object moving in a straight line is given by $s(t) = t^2 + 5t + 2$. Find the instantaneous velocity when t = 5.

14) Suppose the total profit in hundreds of dollars from selling x items is given by $P(x) = 2x^2 - 4x + 5$. (a) Find the average rate of change of profit for the changes for 2 to 5 items. (b) Find the instantaneous rate of change of profit when x = 2.

15) Problem 37 on page 176 of the 2nd half of the textbook.

16) The revenue in dollars generated from the sale of x items is given by $R(x) = 10x - \frac{x^2}{100}$.

(a) Find the marginal revenue when 500 items have been sold. (b) Estimate the revenue from the sale of the 601st item by finding $R'(600)$.

Find the derivative of each.

17) $y = 3x^5 - 6x^3 + \frac{1}{2}x^2 - 2x$

18) $f(x) = 10x^{-4} - \frac{7}{x^3} + 3x$

19) $g(x) = (2x^2 - 5)^2$

20) $y = (3x^2 + 1)(2x^2 - 4x + 3)$

21) $q(x) = \frac{x^2 + 7x - 2}{x^2 - 2}$

22) Find $f'(2)$ if $f(x) = x^4 - \frac{4}{3}x^3 + 2x^2 - 5x + 8$.

23) Find all points on the graph of $g(x) = x^3 + 9x^2 + 19x - 10$ where the slope of the tangent line is -5.

24) Find an equation of the line tangent to the graph of $f(x) = \frac{x}{x-2}$ at the point (3,3).

25) Assume that the total number (in millions) of bacteria present in a culture at *t* hours is given by $N(t) = 4t^2(t-20)^2 + 20$. Find the rate at which the population of bacteria is changing at 5 hours and at 8 hours.