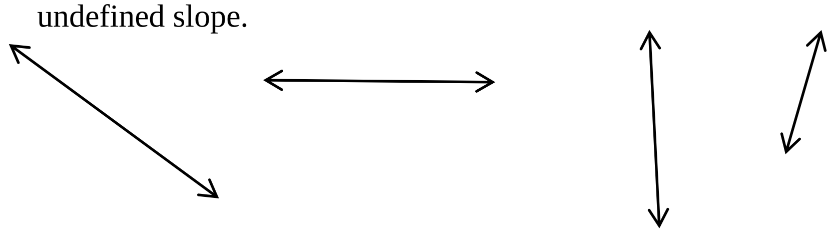
MA 22000 Review for Exam 2

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 $\left(-\frac{7}{2},-5\right)$

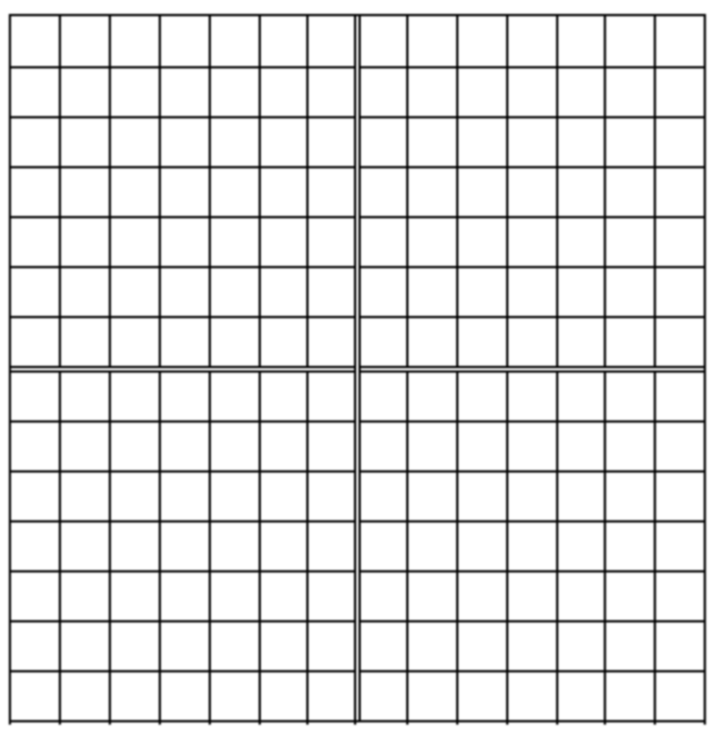
2) Find the equations of a vertical line and a horizontal line through the point (-5, 3).

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



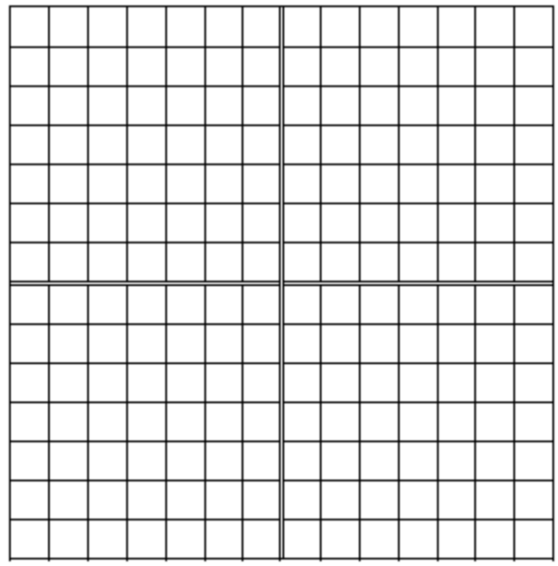
4) Sketch the graph of each line using the slope and a point.

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



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

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

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

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) Problems 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.

26) For the functions $f(x) = 9 - 8x$ and $g(x) = x^2 + 2x$, find $f(g(x))$ and $g(f(x))$.

27) If $y = f(g(x))$ and $y = -\sqrt{12 + 5x}$, write two possible functions $f(x)$ and $g(x)$.

Find the derivative of each.

28) $y = (3x^4 + 12x^2)^5$

29) $r(t) = 8t(3t^2 - 4)^3$

30) $y = \dfrac{2}{(4x^2 - 3)^4}$

31) Find the equation of the tangent line to the graph of $g(x) = (x^3 + 7)^{2/3}$ at the value $x = 1$.

32) The total number of bacteria (in millions) present in a culture after t hours after the beginning of an experiment is given by $N(t) = 3t\sqrt{5t + 9}$. Find the rate of change of the population of bacteria with respect to time after 0 hours and after 8 hours.