

This is a review sheet for the first midterm in Hillel's MAT 16A. It is a list of the topics that will be covered on the exam along with sample questions. The exam itself will **not** be this long!!! Some of the questions on it though will be very similar to questions on this review sheet and/or the homework. Good luck studying!

Chapter 1

- Sections 1.1 -1.4
 - Know what the Cartesian Plane is, the distance and the midpoint formulas and how to use them. (1.1)
 - Know how to draw a graph given an equation. Be able to find the x - and y - intercepts. Know how to recognize the equation of a circle, how to graph a circle and how to complete the square in order to graph a circle. (1.2)
 - Know how to find the slope of a graph, the meaning of the slope and how to write the equation of a line ($y = mx + b$) given the slope and a point, or two points. (1.3)
 - Know what a function is, how to find its domain and range. Be able to explain the idea of a 1-1 function. Given two functions, know how to find the composite function and be able to find the inverse function. (1.4)

Sample problems:

1) Draw the following points on the Cartesian Plane, find the distance between them as well as the midpoint between them:

a) (2, -5) and (8, 4)

b) (-2, -3.5) and (-2, 6)

2) Complete the square, write the equation of the circle and graph it:
 $x^2 + y^2 - 4x - 2y + 3 = 0$

3) For the following, write the equation of the line:

a) (2, 3) and (-1, 6)

b) $m = 2$ and (2, 4)

Problems 1-8, p. 45 are good as far as knowing what a function is.

4) What's the domain of:

a) $\sqrt{2x - 5}$

b) $\ln(x + 3)$

c) $\frac{x}{\sqrt{x + 2}}$ Problems 35-41 p.45 are good for composite functions.

5) What's the inverse of a, b, c from problem 4 above?

- Sections 1.5-1.6, 3.6
 - Know what a limit is, its definition and when it exists. Be able to explain the idea of a one sided limit. Be able to find a limit for a variety of situations (i.e. one-sided limits, limits to infinity). (1.5)

- Know what continuity is and its meaning for a point, an open set and a closed set. (1.6)

- Know the difference between vertical and horizontal asymptotes and be able to find them for a variety of problems. (3.6)

Sample problems:

For limits, there are a bunch of problems in the book (23-58, p. 59). One of these may show up on the exam in some form or another.

6) Describe the intervals on which the functions below are continuous:

a) $f(x) = x^7 - 5x^2 + 16$

b) $f(x) = \frac{x - 4}{x^2 - 5x - 14}$

c) 27 on p.70, or similar problems.

7) Find the asymptotes of:

a) $f(x) = \frac{x - 2}{x^2 - 4x + 3}$

b) $g(x) = \frac{x^2 - x - 2}{x - 2}$

More of these on p. 228.

• Sections 2.1-2.2

-Know the definition of the derivative. Know how to use the definition to find a derivative. Know when a derivative of a continuous function does not exist. (2.1)

- Know how to take derivatives of different functions using the different rules (shortcuts) covered in section 2.2.

- Know how to use the derivative at a point to find the equation of the line tangent to the graph at that point.

Sample problems:

8) Use the definition of the derivative to find the derivative of:

a) $f(x) = \sqrt{x - 2}$

b) $y = \frac{3}{x^2}$

9) Differentiate the following functions:

a) $y = x^7 - 3x^3 + 25,000$

b) $f(x) = \sqrt[3]{x^7} - \frac{5}{x^5}$

More such problems on p. 102

10) Find the line tangent to the graph of $f(x) = 5x^2 - \frac{10}{x}$ at the point (1, -5).