Math 140

Exam on Chapter P and 1 Information

What you should know From Chapter P:

- How to find the intercepts of a graph.
- How to test for symmetry about the x-axis, y-axis and the origin. See page 5.
- How to find the point(s) of intersection of two graphs.
- The definition of slope of a line.
- The slope-intercept form of a line \((y = mx + b)\), the point-slope form \((y - y_1 = m(x - x_1))\), and general form \((Ax + By = C, \text{ where } A, B \text{ and } C \text{ are integers})\).
- Know the slope is the rate of change of a line.
- How to graph a line.
- Equations of vertical and horizontal lines (see page 14).
- The relationship between the slopes of parallel lines (they are equal) and perpendicular lines (the slopes are negative reciprocals).
- The definition of a function (see page 19).
- How to evaluate a function. Especially the difference quotient: \(\frac{f(x+\Delta x) - f(x)}{\Delta x}\).
- How to find the domain and range of a function.
- How to work with piece-wise functions. See Example 3 on page 21.
- The graphs of the 8 basic functions given on page 22.
- How to use transformations to graph functions (see page 23).
- What a polynomial is, what the degree of a polynomial is.
- How to find the composition of two functions.
- Given a composition, how to find the two functions that make it up.
- Even and odd functions (see page 26).

What you should know From Chapter 1:

- How to determine if a problem can be solved using precalculus, or calculus (see Section 1.1).
- How to estimate a limit numerically. You need to know this means to use a table of values!
- How to estimate a limit graphically.
- The different ways limits fail to exist (see page 51).
- The formal \(\varepsilon - \delta\) definition of a limit and how to use it for a linear function.
- How to evaluate limits analytically (using algebra). See Theorems 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8 and 1.9 in Section 1.1.
Know when you can use direct substitution and when you cannot. Also, you need to know that when you come up with a limit of \( \frac{0}{0} \) this is the indeterminate form. You need to do more work to determine the answer in this case.

- How to divide out like factors to evaluate a limit.
- How to rationalize the numerator.
- Know the two special trig limits: \( \lim_{\theta \to 0} \frac{\sin \theta}{\theta} = 1 \) and \( \lim_{\theta \to 0} \frac{1 - \cos \theta}{\theta} = 0 \).
- Know the three ways a function is NOT continuous at a point \( x = c \).
- Know the definition of continuity at a point \( x = c \).
- Know how to discuss the continuity of a function.
- Know how to evaluate one-sided limits and how to use the one-sided limit notation correctly.
- Know Theorem 1.10.
- Know the definition of continuity on a closed interval.
- Know the properties of continuity (Theorem 1.11).
- Know how to apply the properties of continuity.
- Know the intermediate value theorem and how to find the point \( x = c \) guaranteed by the theorem. See for example problems 95 and 97 in Section 1.4.
- Have a good understanding of infinite limits.
- Know the definition of a vertical asymptote.
- Know the properties of infinite limits (see Theorem 1.15).

**Review Problems**

I suggest you be able to do the following problems.

Chapter P Review: On pages 37 and 38 do problems 1 – 49 odd

Chapter 1 Review: On pages 91 and 92 do problems 1 – 83 odds.