Midterm one covers the topics discussed in lecture during our first four class meetings: sections 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, and 1.8. The relevant homework assignments are “online homeworks” one, two, and three, and “textbook homeworks” (i.e. paper and pen) one, two, and three. Below is a summary of the topics/skills you need to master from each section; in some cases, example problems from the textbook homework assignments are provided to illustrate what is meant by the particular skill. Remember that all of the “textbook homework” problems are on the homework page of the course website.

- **Section 1.1**: Know how to find the formula for a linear function given two points on the line or one point on the line and its slope. Know how to set up and solve word problems involving linear functions. Know how the slopes of parallel lines are related to one another. Know how the slopes of perpendicular lines are related to one another.
- **Section 1.2**: Know how to find the formula for an exponential function given its initial value and growth rate (i.e. its percentage increase or decrease). Know how to find the formula for an exponential function given two input/output pairs. Know how to set up and solve word problems involving exponential functions.
- **Section 1.3**: Given the graph of \( y = f(x) \), know how to graph \( y = -f(x) \), \( y = f(x+a) \), \( y = f(ax) \), and \( y = af(x) \) (e.g. problems like HW 1.3.22). Know how to find the composition of two given functions, i.e. \( f(g(x)) \). Given a function in real world context, know how to explain the practical meaning of equations involving the function and its inverse, (e.g. problems like HW 1.2.18).
- **Section 1.4**: Know the meaning of the notation \( \log_a(x) = c \). Know the properties of exponential and logarithmic functions and how to use them to solve equations. Know how to find the inverse of a given exponential or logarithmic function (e.g. problems like HW 1.4.30). Know how to set up and solve word problems involving exponential functions.
- **Section 1.5**: Know how to evaluate trig functions at standard angles, e.g. \( \sin(\pi/3) \), \( \cos(\pi) \), etc. Know how to graph functions of the form \( y = A\sin(Bt) + k \) and \( y = A\cos(Bt) + k \). Conversely, know how to find a possible formula for a sinusoidal function given its graph (e.g. problems like HW 1.5.20). Know how to solve equations involving trig functions.
- **Section 1.6**: Know how to find a possible formula for a polynomial given its graph (e.g. problems like HW 1.6.18), and conversely, know how to graph a given polynomial that has been factored for you. Know how to find the vertical asymptotes and horizontal asymptotes of a rational function.
- **Section 1.7**: Know how to find the points where a function is discontinuous from looking at its graph. Know how to find the points where a function is discontinuous from looking at its formula (e.g. problems like HW 1.7.2).
- **Section 1.8.**: Know the meaning of the notation:

\[
\lim_{x \to a^{-}} f(x) = L, \quad \lim_{x \to a^{+}} f(x) = L, \quad \lim_{x \to a} f(x) = L,
\]

where \( a \) is some finite number. Also know the meaning of the notation:

\[
\lim_{x \to \infty} f(x) = L, \quad \lim_{x \to -\infty} f(x) = L.
\]

Know how to compute limits from graphs. Know how to compute limits from formulas (e.g. problems like HW 1.8.31 and 1.8.57).