Math 120 Midterm 2 Mechanical skills summary

Here are some of the specific mechanical skills you will want to be sure you have well-practiced for the second midterm exam.

- Composition/Inverses/Shifting/Dilating
  - Given $f(x)$ and $g(x)$, determine and simplify the rule for $f(g(x))$.
  - Given $f(x)$, find its fixed points.
  - Given a set of one or two points, find a function with those points as fixed points.
  - Given a one-to-one function $f(x)$, find $f^{-1}(x)$.
  - Given a function's graph, determine whether or not the function has an inverse.
  - Given a one-to-one function's graph, sketch the graph of $f^{-1}(x)$.
  - Given a quadratic function, restrict its domain to get a one-to-one function and find its inverse (there are two such).
  - Given the graph of a function $f(x)$, sketch the graph of $Af(Bx + C) + D$ for given values, A, B, C, and D.
- Exponential functions and logarithms
  - Find the exponential function specified by its value at two times.
  - Find the exponential function specified by its value at one time and its doubling time.
  - Find the exponential function specified by its value at one time and its "growth rate" (e.g., 4.5% per year).
  - Solve an equation involving exponential functions (specifically, ones of the form $Ab^t = Cd^t$).
  - Find the doubling time of a given exponential function.
- Linear-to-Linear rational functions
  - Find the linear-to-linear function specified by three points.
  - Find the linear-to-linear function specified by two points and an asymptote.
  - Find the linear-to-linear function specified by a point and two asymptotes.
  - Find the inverse of a given linear-to-linear function.
- Measuring Angles
  - Convert between degrees and radians.
  - Be able to use the relationships between radii, angle, arc length and area.
- Measuring Circular Motion
  - Be able to convert between various units of angular speed, e.g. rpm, radians per second, degrees per hour.
  - Be able to use the relationship between radius, angular speed and linear speed to find any of these quantities given the other two.
  - Be able to solve belt-and-pulley problems (e.g., the bicycle example from lecture).