

## **Week 5**

### **June 2016**

### **Guidelines for graphing functions**

1. Identify the domain or interval of interest
2. Find the first derivative. Identify critical points and the intervals where the function is increasing/decreasing.
3. Identify extreme values (minimums and maximums).
4. Find the second derivative. Identify inflection points and the intervals where the function is concave up or concave down.
5. Locate all asymptotes (horizontal and vertical).
6. Find  $x$ - and  $y$ -intercepts
7. Choose an appropriate graphing window and plot a graph!

### **Guidelines for optimization problems**

1. Understand the problem and draw a diagram (where applicable). Clearly label the relevant variables/parameters. This is perhaps the most important step.
2. Write equation(s) that describe the given information in terms of the defined variables.
3. Identify the quantity of interest; i.e. the function to be optimized/ the objective function. Identify the independent variable.
4. Write an equation that relates the quantity of interest to the other variables/parameters.
5. Differentiate the equation you found in the previous step with respect to the independent variable. Use implicit differentiation if necessary. You might need to use the equation(s) you found in step 2.
6. Identify critical numbers and use methods of calculus to find the absolute min/max. Be careful to note the domain of the objective function.