1. Determine whether the following statements are True or False. If False, provide a description (or theorem or picture or counterexample…) that explains your position.
   A) If $y=f(x)$ is increasing and differentiable and delta $x>0$, then delta $y>dy$.
   B) The sum of two increasing functions is increasing.
   C) If f1 is concave up and f2 is concave down on an interval I, then f1f2 is neither concave up nor concave down on I.

2. Let $t(x)=\tan x$ and notice that $t(0)=t(\pi)=0$. Does there exist a number w for which $t'(w)=0$? Why or why not?
3. Consider the function $h(t)=t-2\sin t$ on the interval $[0,2\pi]$. Find all critical numbers of h, state the intervals of increase/decrease, and find all relative extrema.
4. Consider the function f(x)=x/x^2+1. State the intervals where the graph is concave upward/downward and find all points of inflection, if applicable.
5. The side of a cube is found to be 10cm long. From this, you find the volume of the cube is 10^3=1000cm^3. If your original measurement of the side is accurate to within 2%, approximately how accurate is your calculation of volume?
6. A box with a square base is constructed so the length of one side of the base plus the height is 10 inches. What is the largest possible volume of such a box?
7. Give a **full analysis** of the function y=x^3+3x^2+1. Include intercepts (approximate if necessary), asymptotes, intervals of increase/decrease, extrema, intervals of concavity, points of inflection, and a sketch. Note: some of this info may not apply to this function.