Math 155. Homework 8. Section 3.3.

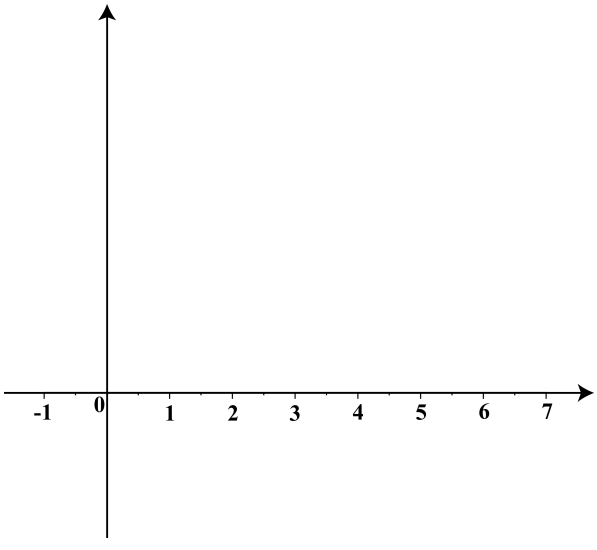
1. Consider the function $f(x) = x^3 - 6x^2 + 10$ on the interval $[-1, 7]$.

   (a) Calculate $f'(x)$, and use this to find all the critical points of $f(x)$.

   (b) Calculate $f''(x)$, and use this to find regions where $f(x)$ is concave up or concave down.

   (c) For each critical point, determine if $f(x)$ has a local maximum or a local minimum there. Justify your answer using the first or second derivative test.

   (d) Use the information found above to sketch a graph of the function $f(x)$ on the interval $[-1, 7]$. Indicate where any local maxima, local minima, global maxima, or global minima occur.



2. (Adler, section 3.3 number 46). Find the maximal harvest from a population following the discrete-time dynamical system

$$N_{t+1} = 1.5N_t(1 - N_t) - hN_t.$$

(a) Find the equilibrium population as a function of h. What is the largest h consistent with a positive equilibrium?

(b) Find the equilibrium harvest as a function of h.

(c) Find the harvesting effort that maximizes harvest.

(d) Find the maximum harvest.