1. **(7 points)** Let $f(x) = 2 + 3x^2 - x^3$. Find the following:

   (a) **(3 points)** its critical points.

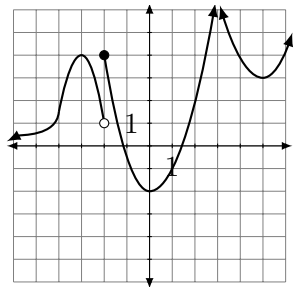
   (b) **(2 points)** its maximum and minimum on the interval $[-2, 1]$.

   (c) **(2 points)** its maximum and minimum on the interval $[-1, 3]$.

2. **(5 points)** We have a conical pile of sand whose height is twice its radius. The pile of sand is currently of radius 3 inches, and sand is falling on it at a rate of 2 cubic inches per minute. How quickly is the radius of the pile increasing? (Note: The volume of a cone is given by the formula $V = \frac{1}{3}\pi r^2 h$, where r and h are the radius and height of the cone respectively.)

3. **(4 points)** Estimate $\sqrt[3]{0.991}$ using a well-chosen linear approximation. *Write your answer as a decimal.*

4. **(4 points)** Identify, either by marking them or by giving the x-coordinates, which points on the below graph are local minima and maxima; *indicate which is which.* Also determine which, if any, points on the graph are absolute extrema on $(-\infty, +\infty)$; if none are, then say so.



5. **(2 point bonus)** Find a formula for a continuous function with exactly one absolute minimum and no absolute maximum on the interval $(-\infty, \infty)$, but with infinitely many local minima.