Instructions. Write your answers in the spaces provided on this exam. You may NOT use a calculator. This exam is closed book and closed notes.

(1) Find the local extreme values of these functions. If there are none, explain why.
   (a) \( f(x) = x^3 - x^2 \)

   (b) \( g(x) = x^3 - 2x^2 + 3x - 4 \)

   (c) \( h(x) = x^2 \ln x \) for \( x > 0 \).

(2) On what interval is the function \( p(x) = x^4 - 3x^2 + x + 1 \) concave down?
(3) Amy sells amulets. It costs $1 apiece to make them. If she charges $2 per amulet, she can sell 50 per day. At a price of $3 apiece, she sells 40 per day. What price yields the maximum profit?

(4) Now in Antigua, Steve and Arlene run a small-scale Ponzi scheme. After $t$ weeks of operation, they have $10 \ln t$ customers who have invested $10$ each. Unfortunately, after $t$ weeks they have paid out $2t^2$ to investors. After how many weeks should they leave there to maximize their profit?

(5) Find the partial derivatives.
   (a) \[ v = x^2 - 4xy^2 + 4y^4 \]

   (b) \[ w = s^2t + \frac{s}{t} \]
(6) Find the tangent plane to the surface \( z = x^2 \ln y \) at the point \((3, 2)\).

(7) Find the minimum value of \( z = 2x^2 - 4x + y^2 - 4xy + 5 \).

(8) What is the Ides of March, and what is its significance?