A graphing calculator is required for some questions on this practice exam.

1. Consider the region bounded by \( f(x) = -2x^2 + 8 \) and \( y = 0 \).

   a) Graph \( f \) in the space below and shade the region mentioned above. (1 pt.)

   b) Find the volume of the solid created by revolving the region in part (a) above around the x-axis. (4 pts.)

   c) Find the volume of the solid created by revolving the region in part (a) above around the line \( y = 8 \). (6 pts.)
2. Let \( f \) and \( g \) be the functions given by \( f(x) = 2x(1-x) \) and \( g(x) = 3(x-1)\sqrt{x} \) for \( 0 \leq x \leq 1 \).

   a) Find the area of the shaded region enclosed by the graphs of \( f \) and \( g \). (4 pts.)

   b) Find the volume of the solid with the shaded region enclosed by the graphs of \( f \) and \( g \) as its base and square cross-sections perpendicular to the \( x \)-axis. (4 pts.)

   c) Find the volume formed by known cross-sections that are perpendicular to the \( x \)-axis on the figure above. Each cross-section should be a rectangle whose height is twice its width. (4 pts.)
3. Find the length of the arc given by \( f(x) = x^2 - \frac{1}{8} \ln x \) for \( 1 \leq x \leq e \). (5 pts.)

4. Find the surface area of the solid formed by revolving the graph of \( y = x^{\frac{3}{2}} \) about the y-axis. Use the part of the curve from (1,1) to (4, 8). Include a sketch of the solid. (6 pts.)