Show all work. Write answers on separate sheet(s) of paper. Keep this sheet for yourself.
There are 110 points available, but the exam is based on 100 points.

(20) 1. Evaluate each of the following limits, using L’Hospital’s Rule where appropriate. Give work or explanation.
   (a) \( \lim_{x \to 0^+} \sqrt{x} \ln(x) \)  
   (b) \( \lim_{x \to 0} \frac{1 - \cos(x)}{x^2} \)

(45) 2. Evaluate each of the following integrals, showing all steps.
   (a) \( \int t \cos(2t) \, dt \)  
   (b) \( \int \frac{2 + x}{1 - x^2} \, dx \)
   (c) \( \int_0^1 \sqrt{1 - t^2} \, dt \)  
   (d) \( \int_1^\infty \frac{1}{1 + x^2} \, dx \)

(30) 3. Let \( f(x) = 2 - x^2 \) and \( g(x) = x^2 \). Let \( R \) be the region between the graphs of \( f(x) \) and \( g(x) \) from \( x = 0 \) to \( x = 1 \).
   (a) Find the exact area of \( R \).
   (b) Find the volume of the solid obtained by revolving \( R \) about the \( x \) axis.
   (c) Find the volume of the solid obtained by revolving \( R \) about the \( y \) axis.

(15) 4. Give parametric equations for each of the following. In each case give an appropriate parameter interval.
   (a) The straight line segment from \((-4, 5) \) to \((1, -3) \).
   (b) The graph of \( 4x^2 - y^2 = 25 \).
   (c) The graph of \( 4x^2 + y^2 = 25 \).