Arrange your work as clearly and neatly as possible, and cross out incorrect work. **Unless otherwise noted, you must justify all answers to receive full credit.** You may not use calculators, notes, or any other kinds of aids.

1. (10 points) Identify and sketch the curve $x^2 + 4x - 5 + 9y^2 = 0$, labeling all vertices.
2. (12 points each) Evaluate each integral.

(a) \( \int \ln(x + 1) \, dx \)

(b) \( \int x^3 \sqrt{4 - x^2} \, dx \)
3. (12 points each) Evaluate each integral, or show divergence.

(a) \( \int_{1}^{4} \frac{1}{x^3 - x} \, dx \)  
(b) \( \int_{1}^{\infty} xe^{-x} \, dx \)
4. (15 points) Find equations for both lines tangent to the curve $x = \sin(2t), y = \sin(t)$ at the origin.
5. (15 points) Carefully plot the polar curve $r = 1 - \sin \theta$, labeling at least four points.
6. (12 points) Find the area of the shaded region.