

Name: \_\_\_\_\_ I.D.#: \_\_\_\_\_

Answer all questions. Calculators are NOT allowed. 30 minutes.

1. Evaluate [20]

$$\int_1^2 (x^{-2} + x^2) dx$$

2. Evaluate [15]

$$\frac{d}{dx} \int_3^x \ln(t^2 + 1) dt$$

3. Derive the formula for the derivative of
- $y = \arcsin(x)$
- . [20]

4. Sketch the graph of  $y = f(x) = e^{-x^2}$ . [45]

(a) Find the domain, range, asymptotes.

(b) Find the intervals where  $f$  is increasing or decreasing.

(c) Find the intervals where  $f$  is concave up or concave down.

(d) Find the  $(x, y)$ -coordinates of all local minima, local maxima, inflexion points,  $x$ - and  $y$ -intercepts, and indicate them on the graph.

END OF PAPER