

- Please put your name, ID number, and section number (or time) on your blue book.
- The exam is CLOSED BOOK.
- Calculators ARE allowed.
- **You must show your work to receive credit.**

1. (10 pts.) Evaluate  $\int_0^2 \sqrt{4-x^2} dx$  by interpreting it as an area.

2. (30 pts.) Evaluate the following integrals using the tools discussed in the text.

$$\int (1-x)\sqrt{2x-x^2} dx \qquad \int_0^2 |\sin \pi x| dx.$$

You will receive NO CREDIT for using a calculator to find the indefinite integral and then verifying by differentiation.

3. (30 pts.) Differentiate the functions

$$F(x) = \int_1^x \sqrt{1+u^4} du \qquad G(x) = \int_{x^2}^1 \ln(1-t^3) dt.$$

4. (30 pts.) Express the following as integrals. **DO NOT EVALUATE** the integrals. Sketches may be useful in obtaining partial credit if you make a mistake.

(a) The area bounded by the 3 curves

$$y = \sin(\pi x), \quad y = x^2 - x \quad \text{and} \quad x = 2.$$

(b) The volume of the solid obtained by rotating the region bounded by the curves  $y^2 = x$  and  $x = 2y$  about the  $y$ -axis.

**END OF EXAM**