

You have 20 minutes to complete this quiz which is worth 20 points. Calculators are permitted, but no other aids are allowed. Show all work neatly and in order, and clearly indicate your final answers. Answers must be justified whenever possible in order to earn full credit. When you do use your calculator, sketch all relevant graphs and write down all relevant mathematics.

**1.** (*4 points*)

(a) Find all antiderivatives of  $f(x) = \frac{1}{x^2}$ .

(b) Find all antiderivatives of  $g(x) = 5x - \sqrt{x}$ .

**2.** (*4 points*) Compute  $\int_2^5 (x^3 - \pi x^2) dx$ .

**3.** (6 points)

(a) Sketch the graph of  $y = \sqrt{1 - x^2}$  over the interval  $[0, 1]$ .

(b) Find the average value of the function  $y = \sqrt{1 - x^2}$  over the interval  $[0, 1]$ .

**4.** (6 points) Let  $\int_0^3 f(x) dx = 6$ .

(a) What is the average value of  $f(x)$  on the interval  $[0, 3]$ ?

(b) If  $f(x)$  is even, what is  $\int_{-3}^3 f(x) dx$ ? What is the average value of  $f(x)$  on the interval  $[-3, 3]$ ?

(c) If  $f(x)$  is odd, what is  $\int_{-3}^3 f(x) dx$ ? What is the average value of  $f(x)$  on the interval  $[-3, 3]$ ?