

# Exam 3

Name:

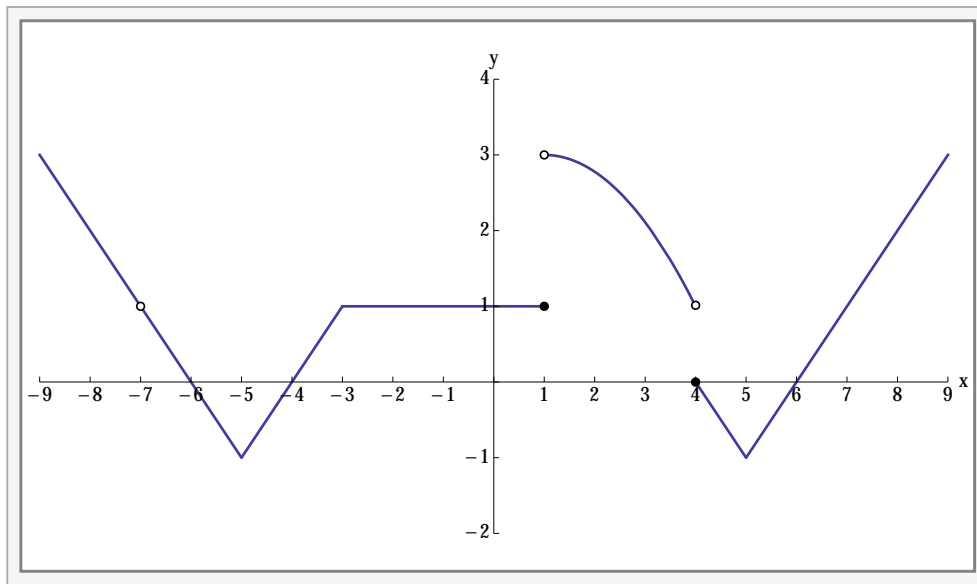
Date: June 25, 2015

**P 1.** [2 Points] State the definition of antiderivative.

**P 2.** [2 Points] State the Fundamental Theorem of Calculus.

**P 3.** [2 Points] State the definition of the average value of a function on an interval.

**P 4.** [6 Points] Consider the graph of  $f$  below.



Use the graph of  $f$  to answer the following. If the limit or the derivative doesn't exist, state so and explain why.

- (a) Find the area between the curves  $y = f(x)$  and  $y = 0$  on  $[-5, -3]$ . (d) Find  $\int_{-5}^{-1} f(x) dx$

(b) Estimate  $\int_2^3 f(x) dx$

- (e) Find the average value of  $f(x)$  on  $[6, 8]$ .

(c) Find  $\int_4^5 f(x) dx$

- (f) Let  $F(x) = \int_4^x f(x) dx$ . Find  $F(4)$  and  $F(7)$ .

**P 5** (4 Points). Find the indefinite integral.

$$\int \frac{x^4 - 3x^2 + 5}{x^4} dx$$

**P 6** (4 Points). Find the indefinite integral.

$$\int \sec y(\tan y - \sec y) dy$$

**P 7** (10 Points). Find

$$\int_1^4 (3 - |x - 3|) dx$$

**P 8** (10 Points). Find

$$\int_0^{\pi/4} \frac{\sec^2 \theta}{\tan^2 \theta + 1} d\theta$$

**P 9** (10 Points). Find the average value of

$$f(x) = \cos x$$

on the interval  $[0, \pi/2]$

**P 10** (10 Points). Find the derivative of

$$F(x) = \int_{-x^2}^{\arctan x} \frac{1}{t^2 + 1} dt$$

**P 11** (10 Points). Find

$$\int x\sqrt{2x-1} dx$$

**P 12** (10 Points). Find

$$\int \frac{1}{\theta^2} \cos \frac{1}{\theta} d\theta$$

**P 13** (10 Points). Sketch and find the area of the region bounded by the graphs of

$$y = \sqrt{4 - x^2} \text{ and } y = 0.$$

**P 14** (10 Points). Sketch and find the area of the region bounded by the graphs of

$$y = x^2 - 1, y = -x + 2, x = 0, \text{ and } x = 1$$