

Name \_\_\_\_\_

- You have 20 minutes
- No calculators
- Show sufficient work

1. (2 points) Precisely state *The Mean Value Theorem*.

2. (2 points) Evaluate the definite integral. Simplify your answer.

$$\int_0^{\pi/2} \frac{\cos x}{e^{\sin x}} dx$$

3. (2 points) Suppose  $f$  is continuous everywhere and  $\int_1^4 f(x) dx = 5$ .

What is the value of  $\int_0^{\sqrt{3}} 4xf(x^2 + 1) dx$  ?

4. (2 points) Evaluate the following indefinite integral. Hint: Use polynomial long division or some other approach to simplify the integrand.

$$\int \frac{x^5 + x^3 + 1}{x^2 + 1} dx$$

5. (2 points) Let  $\mathbf{R}$  be the finite region bounded by  $y = \ln x$ ,  $y = 2$ ,  $y = 3$  and  $x = 0$ . In the following manner, set up but do not evaluate definite integrals which represent the area of the region  $\mathbf{R}$ .

(a) Integrate with respect to  $x$ .

(b) Integrate with respect to  $y$ . (The integrands in parts (a) and (b) should be different.)