

Math 1496 - Sample Test 3

1. Using n rectangles and the limit process, find the area under the given curve.

$$y = 3x - x^2 \text{ on } [1, 3]$$

2. Find the area bound by the following curves

$$y = x^2 \quad y = 2 - x, \quad x = 0, \quad x, y \geq 0.$$

3. Evaluate the following

$$(i) \frac{d}{dx} \int_1^x \sin(t^2) dt \quad (ii) \frac{d}{dx} \int_x^{x^2} \sqrt{1+t^2} dt$$

4. Find the following limits

$$(i) \lim_{x \rightarrow \infty} \frac{e^x - 1}{e^x + 1} \quad (ii) \lim_{x \rightarrow 0^+} x \ln x \quad (iii) \lim_{x \rightarrow 0^+} x^x$$

5. Evaluate the following indefinite integrals

$$(i) \int \sec^2 x \tan x dx \quad (ii) \int \frac{e^{1/x}}{x^2} dx \quad (iii) \int \frac{x}{x^2 + 1} dx$$
$$(iv) \int_1^5 x\sqrt{x-1} dx \quad (v) \int_0^{\pi/4} \sin x \cos x dx \quad (vi) \int_0^1 \frac{1}{\sqrt{4-x^2}} dx$$