

Jan. 24, 2001

Name _____

Soc. Sec. # _____

TA & Rec. hour _____

Math. 152 – Midterm 1 – Form A

SHOW YOUR WORK!

Note: A random sample of graded exams will be xeroxed.

1) (15 points) The following sum

$$\left|3 - \frac{5}{n}\right| \frac{5}{n} + \left|3 - \frac{10}{n}\right| \frac{5}{n} + \left|3 - \frac{15}{n}\right| \frac{5}{n} + \dots + \left|3 - \frac{5n}{n}\right| \frac{5}{n}$$

is a right Riemann sum approximating a definite integral $\int_a^b f(x) dx$, using a partition of the given interval $[a, b]$ into n equal parts. Write down such a definite integral. Using this fact compute the limit of these sums as $n \rightarrow \infty$. (Note: you can interpret the integral as the sum of areas of two elementary geometric figures.)

2) (26 points) Find the following indefinite integrals

(a) $\int \frac{5t^2 - 2}{t^2} dt$

(b) $\int \frac{\cos(6x)}{\sin(6x) + 7} dx$

3) (26 points) Find the following definite integrals

$$(a) \int_{-1}^1 \frac{1}{2 + |u|} du$$

$$(b) \int_0^{\pi/3} \frac{\sin(x)}{\cos^6(x)} dx$$

4) (15 points) Find the derivative $\frac{dy}{dx}$ where $y = \int_0^{\sqrt{x}} s \sqrt{1 + s^4} ds$, using the Fundamental Theorem of Calculus.

5) (18 points) Find the total area between the graphs of $y = x^3 - 3x$ and $y = x^2 - x$. Note that the enclosed region consists of two parts.