

Math 122 EXAM #1

Name _____

I.D. # _____

1. (20 pts) Find the following integrals and state the substitution you use if you use substitution method, state the function U and V (or f and g) if you use the integration by parts, state the formula number if you use the table of integrals.

(a) $\int \frac{(\sqrt{x}-7)^{99}}{\sqrt{x}} dx$

(b) $\int \cos\theta e^{\sin\theta} d\theta$

(c) $\int \frac{3}{\sqrt{x^2+2x+5}} dx$

(d) $\int \sin^{-1} x dx$

2. (20 pts) Determine if the following improper integrals converge or diverge. Explain your reasoning.

(a) $\int_1^{\infty} \frac{\sqrt{x} - \sin x}{x+100} dx$

(b) $\int_1^2 \frac{x}{\sqrt{x^2-1}} dx$

(c) $\int_1^{\infty} \frac{1}{x^2+\sqrt{x}} dx$

(d) $\int_0^1 \frac{1}{x^2+\sqrt{x}} dx$

3. (a and b 4 pts each and c 12 pts)

(a) Write the left hand Riemann sum for the approximation of $\int_a^b f(x)dx$ with n subintervals.

(b) Write the midpoint Riemann sum for the approximation of $\int_a^b f(x)dx$ with n subintervals.

(c) Estimate the integral $\int_0^{\frac{\pi^2}{4}} \sin(\sqrt{x})dx$ with $n = 4$ using left sum, midpoint sum, and simpson's sum. State whether each sum is an overestimate or underestimate.

4. (10 pts) Find the work required to pump out a swimming pool, if the area of the base is 800 square feet, the water is 4 feet deep, and the top is one foot above the water level. (Note that the density of water is 62.4 lb/ft^3)

5. (10 pts) Find the arc length of the function $f(x) = \sqrt{x}$ from $x = 0$ to $x = 4$.

6. (10 pts) Find the volume of the solid obtained by rotating the region bounded by $f(x) = \sqrt{x}$, $y = 0$, and $x = 4$ about x -axis.

7. (10 pts) Find the volume of the solid obtained by rotating the region bounded by $f(x) = \sqrt{x}$, $y = 0$, and $x = 4$ about y -axis.