

SCORE_____

1. Find the arc length of

$$f(x) = \frac{2}{3}x^{3/2} + 1$$

on the interval $[0, 1]$.

[10 points]

2. Set up but do not evaluate that will produce the surface area of the solid produced by rotating the curve $f(x) = \cos^2 x$ on the interval $[0, \frac{\pi}{3}]$ about the x -axis.

[10 points]

3. Evaluate the following integral

$$\int_0^{\infty} x e^{-x} dx$$

[15 points]

4. Evaluate the following integral

$$\int_{-1}^0 \frac{dz}{z^2 + 3z + 2}$$

[15 points]

5. Find the Simpson's rule approximation for the following integral using $n = 4$.

$$\int_0^2 \frac{1}{\sqrt{1+x^3}} dx$$

[10 points]

6. Find the Trapezoidal rule approximation for the following integral using $n = 4$.

$$\int_0^2 \frac{1}{\sqrt{1+x^3}} dx$$

[10 points]

7. Find the Midpoint rule approximation for the following integral using $n = 4$.

$$\int_0^2 \frac{1}{\sqrt{1+x^3}} dx$$

[10 points]

8. Which of the following integrals are improper? Why?

[10 points]

(a) $\int_0^\pi \tan x \, dx$

(b) $\int_0^{\pi/4} \tan x \, dx$

(c) $\int_{-\infty}^3 \frac{5x}{x^2 + 2x + 3} \, dx$

(d) $\int_{-1}^1 \frac{2}{x^2 - 4x} \, dx$

9. Use the error formula $E \leq \frac{k(b-a)^5}{180n^4}$ to find n such that the error in the approximation of the definite integral is less than 0.00001 using Simpson's rule.

$$\int_0^2 \sqrt{x+2} \, dx$$

[10 points]