

1. 10 pts. each Use geometry (not Riemann sums) to evaluate the definite integral.

(a) $\int_{-1}^{10} |x - 3| dx$

(b) $\int_1^5 \sqrt{-x^2 + 6x - 5} dx$ (Hint: complete the square in the radicand)

2. 10 pts. each Evaluate each definite integral using the Fundamental Theorem of Calculus.

(a) $\int_0^4 t(t - 2)(t - 4) dt$

(b) $\int_1^8 \sqrt[3]{x} dx$

(c) $\int_{\pi/4}^{3\pi/4} (\cot^2 \theta + 1) d\theta$

3. 10 pts. Find the derivative: $\frac{d}{dx} \int_{\cos x}^9 \frac{6}{\sqrt{t^6 + 9}} dt$.

4. 10 pts. each Use a change of variables (substitution) to find the following.

(a) $\int_0^1 (x^6 - 3x^2)^4 (x^5 - x) dx$

(b) $\int \frac{\cos \sqrt{r}}{\sqrt{r}} dr$

(c) $\int \frac{x}{\sqrt[3]{x+4}} dx$

5. 10 pts. Find the area of the region enclosed by the curves $y = 3x - x^2$, $y = x$, and $x = 3$.

6. 10 pts. Use the General Slicing Method to find the volume of the solid whose base is the triangle with vertices $(0, 0)$, $(3, 0)$, and $(0, 3)$, and whose cross sections perpendicular to the base and parallel to the y -axis are semicircles.

7. 10 pts. Use the Disc Method or Washer Method (whichever is appropriate) to find the volume of the solid generated by revolving about the x -axis the region bounded by the curves $y = \sqrt{25 - x^2}$, $y = 0$, $x = 2$, and $x = 4$.