

MATH 134 Calculus 2 with FUNdamentals

Practice Exam #2

1. Let R be the region bounded by the curves $y = |x|$ and $y = 12 - x^2$.

- (a) Sketch the region R in the xy -plane.
- (b) Find the area of the region R .

2. **Solids of Revolution:** Give the **exact** answers (no decimals).

- (a) Let A be the region under the graph of $f(x) = \sin x$ from $x = 0$ to $x = \pi$. Find the volume of the solid of revolution obtained by rotating A about the x -axis.
- (b) Let B be the region enclosed by the graphs of $x = 0$, $y = 3$, and $y = x^2 + 2$. Find the volume of the solid of revolution obtained by rotating A about the x -axis.

3. Evaluate the following integrals using the appropriate method or combination of methods.

(a) $\int t^3 \ln t \, dt$

(b) $\int \sin^5 \theta \, d\theta$

(c) $\int \frac{2x + 24}{(x - 3)(x + 2)} \, dx$

4. Evaluate the integral $\int \frac{1}{(9 - x^2)^{3/2}} \, dx$ using the trig substitution $x = 3 \sin \theta$.

5. Consider the two integrals below. One of these can be found using a u -substitution while the other requires trig substitution. Determine which is which and evaluate **both** integrals.

(a) $\int \frac{x}{\sqrt{x^2 + 4}} \, dx$

(b) $\int \frac{1}{\sqrt{x^2 + 4}} \, dx$

6. **Calculus Potpourri:**

- (a) Find the average value of $f(x) = xe^{3x}$ over the interval $[0, 3]$. Give the **exact** answer (no decimals).
- (b) The population of Owenville has a radial density function of $\rho(r) = 20(3 + r^2)^{-2}$, where r is the distance (in miles) from the city center and ρ is measured in thousands of people per square mile. Calculate the number of people living within 10 miles of the center of Owenville (round to the nearest whole number).