

CALCULUS TWO MAKEUP TEST SAMPLE QUESTIONS

SHOW ALL CALCULATIONS. GIVE MATHEMATICALLY EXACT FORM OF ANSWERS.

EACH NUMBERED PROBLEM IS 12.5 POINTS. BEST 8 COUNT, FOR A SCORE OUT OF 100. Page 1 of 1.

1. Find the **indefinite integral** $\int \sec^4 x \cdot \tan^3 x \, dx$

2. Find the **indefinite integral** $\int \frac{dx}{(16 - x^2)^{3/2}}$ using **trigonometric substitution**.

3. **Define** $\int_0^3 \frac{x}{\sqrt[3]{9 - x^2}} \, dx$ using a limit, and **evaluate**.

4. Find the **indefinite integral** $\int \frac{x - 8}{x(x^2 + 4)} \, dx$

5. Solve the differential equation. $2yy' = (\tan^{-1} x)(y^2 + 1)$

6. Solve the differential equation $xy' - 7y = x^8 \sec x \tan x$

7. Find the **centroid** of the region bounded by the x-axis, $y = \sin x$, $x = 0$, $x = \pi$.
Draw an appropriate **diagram** with coordinates.

8. Consider the **rose** $r = 8 \cos(2\theta)$. (a) Set up an integral to find the arclength of the rose.

(b) Find the slope of the tangent line at the point with $\theta = \pi/6$, $r = 4$.

9. Consider the function $y = e^{-3x} \sin(4x)$

(a) Find the first and second derivatives.

(b) On the interval $[0, \pi]$ Find the (x, y) -coordinates of all x -intercepts, local maxima, local minima, and inflection points. You may approximate to four decimal places, but you must show how to use y' and y'' to find these points.

(c) Sketch a graph of the function over the interval in (b), with the points from (b).

(100 points, total.)