

Calculus II – Exam 2 Review

The exam will cover sections 2.1-2.4 (solids of revolution and arc length/surface area), and sections 3.1-3.4 (Section 3.7 will be covered after the exam). There is a table of formulas attached to this review, and that table will be provided for the exam. No other notes or calculators will be allowed.

Analyze the following integrals and state which method you need to use to solve it. If you use trig substitution, make the substitution and simplify your integral. If you use regular substitution, convert the integral using that substitution. If you need to use integration by parts, state what the u and dv would be (for extra practice, finish these off).

A. $\int \frac{\sqrt{x^2 + 16}}{x^2} dx$

B. $\int x^2 \sin(3x) dx$

C. $\int \frac{x+1}{(x+3)(x-1)} dx$

D. $\int \cos^2 x \sin^3 x dx$

E. $\int x \ln(x) dx$

F. $\int \sec^4(2x) dx$

G. $\int \frac{2x-3}{x^3+x} dx$

H. $\int \frac{x^2}{\sqrt{x^3+4}} dx$

I. $\int \frac{\sqrt{4-x^2}}{x} dx$

J. $\int \sqrt{x^2-16} dx$

In this case, using your trig substitution, also convert $\tan(\theta)$ into an expression in x . (This would be something you would need to do if we evaluated the integral)

Analyze the following problems and state which formula/method you need to use to solve it. Set up the integral, but you do not have to evaluate it.

- A.** Find the volume of the solid of revolution bounded by the graphs of $f(x) = x^2 - 4x + 5$, $x = 1$, and $x = 4$, and rotated about the x -axis.
- B.** Find the length of the curve $y = 2x^{3/2}$ over the interval $[0, 1]$.
- C.** Find the volume of the solid of revolution bounded above by the graph of $f(x) = 1/x$, below by the x -axis over the interval $[1, 3]$ and rotated around the y -axis.
- D.** Define R as the region bounded above by the graph of the function $f(x) = \sqrt{x}$ and below by the graph of the function $g(x) = 1/x$ over the interval $[1, 4]$. Find the volume of the solid of revolution generated by revolving R around the y -axis.
- E.** Find the volume of a solid of revolution formed by revolving the region bounded by the graphs of $f(x) = \sqrt{x}$ and $g(x) = 1/x$ over the interval $[1, 3]$ around the x -axis.
- F.** Find the surface area of the volume generated when the curve $y = 7x$, $0 \leq x \leq 1$, is revolved around the x -axis.

NOTE: We've also had in-class worksheets for the solids of revolution, so look those over if you need more practice (solutions are provided in the links as well).