

Final Exam Formulas ~ Memorize vs Provided

Calculus II ~ Prof. Sally Keely

The Mathematics Dept faculty who teach the Calc I-IV sequence met in early 2025 to come to a consensus on which formulas are allowed to be provided to students on an exam in an online class held on-campus, like our final exam. I argued on your behalf for more rather than fewer references available because I feel that's how STEM in the real world works :)

I share several formula sheets with you throughout the term. Here are specific allowed uses on the final exam:

1. You are expected to **MEMORIZE**:

- The trig ID $\cos^2 \theta + \sin^2 \theta = 1$,
- The hyperbolic trig ID $\cosh^2 \theta - \sinh^2 \theta = 1$,
- and TEN of the functions (with their derivatives and integrals) listed on [Prof. Keely's Derivatives & Integrals Formula Sheet](#).

MEMORIZE the first four rows (exponential/logarithmic functions), plus the first three trig functions (sine, cosine, tangent), plus the first three hyperbolic trig functions. No need to memorize the rest! If any of the problems on the Final Exam require a derivative or integral listed on this sheet other than these ten functions, it will be provided to you on the exam.

2. You should also **MEMORIZE** formulas that help you:

- set-up an integral that gives the area under a curve, the area between two curves, the volume of a solid by slicing (disk, washer, cross-section) and by shell
- set-up an integral by parts
- what to let the u-sub be in the trig integrals technique of integration (except I did not test on the integrals with powers of tangent/secant, just sine/cosine)
- what to let the u-sub be in the trig substitution technique of integration (except I did not test on the trig sub involving secant, just sine and tangent)
- evaluate a limit by L'Hopital's Rule
- convert between rectangular and polar coordinates

3. You should **MEMORIZE** the seven indeterminate forms.

4. You do not have to memorize per se, but better yet **understand geometrically**:
- the two symmetry properties of definite integrals
 - Mean Value Theorem (MVT) for integrals
 - Average Value (AV) Theorem of a Function on an Integral
5. Regarding the following formulas, if any of the problems on the Final Exam require a formula or identity listed on any of these, it will be **PROVIDED** to you on the exam:
- [Prof. Keely's Trigonometric Identities Sheet](#) (except the one ID listed above)
 - [Prof. Keely's Hyperbolic Trig Identities Sheet](#) (except the one ID listed above)
 - The four "special limits" from Calc I
 - Net Change Theorem, Net Change on Q, Future Value Theorem
 - Arc Length formulae (in x and in y), Surface Area formulae (in x and in y)
 - Common units of work and force, Work as an integral of force formula, Hooke's Law, Fluid force (variable depth) formula, Moment about x or y , Centroid point
 - [Common Polar Curves from Prof. Kate Niedzielski, Univ. of Minnesota.](#)
 - [Prof. Keely's Parametric and Polar Calculus Formulas](#)
6. Partial fractions may appear on the Calculations Exam, but not on the Final Exam, since they are so calculator/software dependent.