

Final Exam (Template) - Math 141, Frank Thorne (thorne@math.sc.edu)

Wednesday, December 13, 2023

Please work without books, notes, calculators, phones, or assistance from others. If you have any questions, ask. Please do your work on separate paper and turn that in.

GOOD LUCK!

- (1) Give the definition of the derivative of a function $f(x)$ at the point $x = a$. (Please give the algebraic definition, using an equation.)

Draw a picture and explain why your equation gives the slope of the tangent line to the graph of $f(x)$ at $x = a$.

- (2) What is the *definite integral* of a function $f(x)$, from $x = a$ to $x = b$? (Please give the algebraic definition, using an equation.)

Draw a picture and explain why your equation gives the signed area under the graph of $f(x)$ between $x = a$ and $x = b$.

- (3) What does the Fundamental Theorem of Calculus say? (Both parts) Why is it important?

- (4) A question from 3.3 or 3.5 asking you to compute a derivative, using the elementary rules and the derivatives for trig functions.

- (5) A Chain Rule problem taken from Section 3.6.

- (6) A related rates problem taken from Section 3.10 or the supplemental practice problem.

- (7) A graphing problem from Section 4.4.

- (8) An optimization problem from Section 4.6.

- (9) A problem from Section 5.4, 1-35 asking you to apply the Fundamental Theorem of Calculus.

- (10) A u-substitution problem from Section 5.5.

- (11) A volume problem from Section 6.1 or the supplementary practice problems.

- (12) One of the conceptual/picture questions on limits and continuity, taken from: 2.2, 1-4, 2.4, 1-10, or 2.5, 1-10.

- (13) A question from Section 2.2 or 2.4 asking you to compute limits given equations, **or** a question from Section 3.2 which involves computing a derivative using the definition.

- (14) A question from Sections 3.4 or 3.7-3.9, or one of the supplementary questions asking you to differentiate one of the inverse trig functions.

- (15) A question from Section 4, other than those covered above.

- (16) A question from Section 5, other than those covered above.