Math 13 Study Guide for Test 2

Applications of the Derivative
Know how to write an equation of the tangent line to \( y = f(x) \) at a point.
Know how to find the intervals on which a function is increasing/decreasing.
Know how to find critical numbers and relative extrema.
Know how to determine concavity and inflection points.
Know how to do curve sketching problems including exp and log equations.
Know when and how to use L’Hopital’s rule.
Know how to do applied max/min problems.
Know how to find absolute extrema.

Problems 198#43; 284#11,17; 298#21; 306#33; 320#23,45,55; 350#10,19; 339#9
Answer 350#10. base = \( \sqrt{2}R \), height = \( \frac{\sqrt{2}}{2}R \)

Indefinite Integrals
Know the 19 rules from class.
Know how to do \( u \)-substitution.
Know how to do integration by parts.

Problems 393#5,17,31,33; 526#6,10,14; 533#1,7,17; 541#25,27;
Answers 526#6. \( \frac{1}{6} \tan^{-1}(\frac{3x}{2}), \#10. \frac{1}{2} \sin^{-1}(x^2), \#14. e^{\tan^{-1}x} \)

Definite Integrals
Know how to use the summation formulas
\[
\sum_{k=1}^{n} c = cn \\
\sum_{k=1}^{n} k = \frac{n(n+1)}{2} \\
\sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}
\]
Know how to compute left and right endpoint approximations of definite integrals.
Know how to compute \( \int_{a}^{b} f(x)dx \) using the formal definition (as a limit of Riemann sums).
Know how to state, prove, and use the Fundamental Theorem of Calculus.
Know how to use a definite integral to compute the area between curves.
Know how to use a definite integral to compute the volume of a solid of revolution.

Problems 405#39,43 ; 414#7; 424#25; 444#39,40; 473#4,9; 480#9,31
Answer 444#40. \( \frac{2}{3}, 473#4. \frac{10}{3} \)

Study your notes, homework, and quizzes. Good Luck!