

Honors Calculus Final Exam Review

Chapter 1

- Know the exact values of the trigonometric unit circle values, definitions, and identities.
- Know what causes a function to be shifted horizontally or vertically, shrunk or enlarged, etc.
- Know how to find appropriate windows for any graph.
- Know different characteristics of functions: domain; range; even, odd, or neither; period.
- Analyze different functions: piece-wise defined, trigonometric, exponential, logarithmic, power, composite, inverses.
- Know how to find horizontal and vertical asymptotes.

Chapter 2

- When evaluating $\lim_{x \rightarrow a}$, these are the possibilities that occur most frequently:

THE FIRST STEP IS ALWAYS TO PLUG a INTO THE FUNCTION!!

Then,

$$\lim_{x \rightarrow a} = \frac{\emptyset}{\emptyset} \quad \text{where } \emptyset \text{ represents a non-zero number--this is your limit, you're done!}$$

$$\lim_{x \rightarrow a} = \frac{0}{0} \quad \rightarrow \text{ simplify by factoring or multiplying by the conjugate, then plug in } a \text{ again to get your limit (or use L'Hopital's Rule)}$$

$$\lim_{x \rightarrow a} = \frac{\emptyset}{0} \quad \rightarrow \text{ check number on one side of } a, \text{ determine the signs of the numerator and denominator, then repeat by checking the other side of } a \text{ in the same manner--your limit is } +\infty, -\infty, \text{ or does not exist (if your answers are different from both sides)}$$

$$\lim_{x \rightarrow a} = \frac{0}{\emptyset} = 0 \text{--this is your limit!}$$

$$\lim_{x \rightarrow \pm\infty} \quad \rightarrow \text{ simplify by multiplying by } 1/\text{ highest power of } x, \text{ then follow previous rules}$$

- Know how to tell whether a function is continuous at a point graphically and algebraically.
- If given the graph of f, f' , or f'' , determine characteristics of the original function or derivatives: concavity, stationary points, extrema, inflection points, increasing/decreasing.
- Know the difference between average and instantaneous rates of change.
- KNOW AND BE ABLE TO APPLY THE LIMIT DEFINITION OF DERIVATIVE.

Chapter 3

- Know all the different rules to find derivatives: product, quotient, powers, chain rule, exponential, logarithmic, trigonometric, and inverse trigonometric.
- Know how to write the equations of a tangent or normal line.
- Know the relationship between distance, velocity, and acceleration.
- Know how to implicitly differentiate.

Chapter 4

- Know how to solve maximum/minimum problems (local & global, finding critical points)
- Know how to solve separable differential equations using exponential and logistic growth.
- Know how to solve problems involving profit, cost, and revenue functions.
- Know how to set up and solve related rates problems.
- Know how to tell whether a function is differentiable at a point graphically and algebraically.
- Apply the Intermediate Value Theorem, Extreme Value Theorem, and Mean Value Theorem to a given situation.

Chapter 5 & 6

- Know the relationships between the area function, the antiderivative, and the derivative algebraically and graphically.
- Know the Fundamental Theorem of Calculus.
- Know how to approximate the area under the curve by using left, right, midpoint, and trapezoidal sums.
- Know how to find the area of any region between curves.
- Know how to evaluate integrals with and without substitution.

Chapter 8

- Know how to set up and evaluate integrals in order to calculate volumes of solids of revolution by disks, washers, cylindrical shells, or numerical integration.
- Know how to solve problems involving arc length (some with and some without integrals).

Chapter 9 & 10

- Know when and how to use integration by parts to evaluate an integral.
- Know when to use L'Hopital's Rule to calculate limits.

Chapter 12

- Know how to create a slope field with and without your calculator
- Know how to find a general solution to a given differential equation, or a specific solution when given a differential equation and a point on the curve.

You may have a 3" X 5" card with any derivative or integral formulas on it. No examples, applications, words explaining how to use a formula or other hints can be on the card. (Ex: $D_x(\cos x) = -\sin x$ is appropriate; steps on how to tell when a function is increasing/decreasing/concave up, etc., is NOT appropriate)

The multiple choice section of the exam will be graded for partial credit if work is shown and the answer is incorrect; however, work does not need to be shown to receive full credit for a correct answer. The free response questions will be similar to what is seen on the AP test and will be somewhat like test questions you see in this class.

Calculators will not be allowed on part or all of the multiple choice problems; and they will not be allowed on part of the free response questions.