

Exam 1 Review

Exam 1 details:

- 5-6 pages of questions
- ONLY the Ti-30x IIS Calculator model is allowed (and required)
- Allowed one **hand-written** 8.5 by 11 in. page (double-sided)
- You must show your work on all problems.
- Covers 10.1, 2.1-2.3, 2.5-2.8 3.1-3.3. You should know all the facts and concepts covered in the homework for those sections.
- You have 80 minutes to complete the exam.

Studying Advice:

- Spend 15-30 minutes reviewing all homework.
- Spend 15-30 minutes flipping through 8+ old exams.
- Spend several hours working through several old exams in detail.
- Practice managing your time, never spend more than 10 minutes on a page!

Exam 1 Basic Facts

1. Precalculus: Know all the standard functions, know trig and trig values, know your algebra skills, know circular motion and basic parametric facts.
2. Limit Foundations: Know limit notation, be able to get limits from the picture of a graph, know definitions.
3. Finite Limits: Know techniques $\neq/0$, $0/0$, factoring, expanding, conjugate, fractions.
4. Limits at Infinity: Know techniques for ∞/∞ , identify known limits, divide top/bottom
5. Continuity and Differentiability: Know what these terms mean!
6. Derivative Foundations: What is $\frac{f(x+h)-f(x)}{h}$, be able to compute this for a given function.
7. The derivative graph: Know the connections between the graphs of $f(x)$ and $f'(x)$.
8. Derivative Rules: Know the sum and coefficient rules, the power rule, the exponential rule, all trig, the product rule and the quotient rule.
9. Applications: Know units of derivative, understand what it represents as a rate, be able to do tangent line questions.

Basic Precalculus:

1. Power/exponent rules.
2. Solving equations (using inverses and the quadratic formula)
3. Understanding what $x = \cos(t)$ and $y = \sin(t)$ gives.
4. Knowing standard trig rules and values (unit circle)
5. Factoring/Expanding/Conjugate
6. Basics of plotting parametric points
7. Functional Notation!

Limits:

First, see my previous postings on the course website reviewing limits.

1. 'Plug in'
2. If it approaches $\frac{?}{0}$ and the numerator is not zero, then examine the sign of the expression from both sides ($-\infty$, $+\infty$, or DNE).
3. If it approaches $\frac{0}{0}$, then use factoring, expanding, conjugates, and simplifying fractions to eliminate the zero in the denominator if possible.
4. If it approaches $\frac{\infty}{\infty}$, then divide top and bottom by $\frac{1}{x^a}$ or $\frac{1}{e^{rx}}$ and try to rewrite the expression in terms of known functions.
5. Know the standard precalculus functions, it helps!
6. Know that $\lim_{x \rightarrow 0} \frac{\sin(x)}{x} = 1$

Derivative Foundations and Basic Facts:

1. What is $\frac{f(x+h)-f(x)}{h}$? What does it represent graphically? What does it represent in an applied problem with units?
2. What is $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$? Same questions as above.
3. What are the connections between the graphs of $f(x)$ and $f'(x)$?

Continuity/Differentiability:

1. Know what it means to be continuous at a point. How do we check it?
2. Know what it means to be differentiable at a point. How do we check it?

Derivative Rules

1. What are the sum and coefficient rules?
2. What are the product and quotient rules?
3. What is the derivative of x^n ?
4. What is the derivative of a^x ?
5. What is the derivative of the 6 trig functions?

Applied Questions:

1. Find the equation for a tangent line given a point on the curve.
2. Find the equation for a tangent line given a point on the line, but off the curve.
3. Set up a problem involving trig or a circle or something from precalculus and do a limit or a derivative.