Honors Calculus Semester 1 Exam Review: 30 questions, multiple choice, calculators allowed

TEXTBOOK SOLUTIONS WITH STEPS: [www.calcchat.com/book/Calculus-7e/](http://www.calcchat.com/book/Calculus-7e/)

**Limits and Continuity 45%**

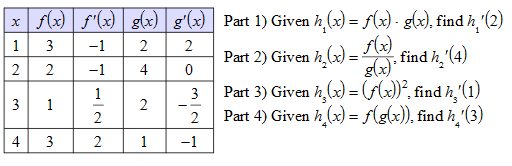
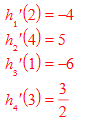
* Given a graph of a function, be able to determine its limits (one-sided and two-sided).
  + p. 55: #9-18
* Determine the limits of a piecewise function (including absolute value functions)
  + ; ; (answer: 3)
  + ; ; (answer: 2)
* Find limits of functions analytically:
  + Using properties of limits: p. 65: 37-40
  + By direct substitution: p. 65: 15-22
  + By factoring: p.66: 45-52
  + By rationalization: p.66: 53-56
  + Of special trig limits: p. 66: 67-70
* Determine the continuity of a function: (limit from the left = function at point = limit from right)
  + $ f(x) = \cases{ x^2+2x ,& if $\space x \le -2 $\space \cr
    x^3-6x ,& if $ x > -2 $\space } $
* Find and classify discontinuities of functions: *jump* (left limitright limit), *removable* (limit exists, but does not equal function), *infinite* (one or both of the left/right limits approaches infinity; v. asymptote)
  + p. 77: 37-47 (except 43 & 44)
* Given a function, be able to find its limit that results in infinity (vertical asymptote)
* Given a function, find its limits *at* infinity. (Horizontal asymptotes)
  + Same degrees: H.A. is y = (ratio of leading coefficients)
  + Numerator degree is higher: no H.A.; or, lim =
  + Denominator degree is higher: H.A. is y = 0
  + p. 199: 19-26
* Find the value of *c* that will make a function continuous:
  + (answer: c = 3)

**Differentiation: Derivatives, Tangent Lines, and Differentiability: 55%**

* Use derivative rules to find derivatives of functions:

|  |  |
| --- | --- |
| **Function** | **Derivative** |
| F(x) | Limit definition: F’(X) = |
| F(x) = c |  |
| F(x) = cx |  |
| F(x) = cxn |  |
| F(x) = (G(x))n |  |
| H(x) = F(x) + G(x) |  |
| H(x) = F(x)\*G(x) |  |
| H(x) = F(x)/G(x) |  |
| H(x) = F(G(x)) |  |
| F(x) = sin(x); cos(x); tan(x) |  |
| F(x) = csc(x); sec(x); cot(x) |  |
| H(x) = e^(F(x)) |  |
| H(x) = ln(F(x)) |  |

* **Practice with above rules:** p. 113: 39-52
* Use the limit definition of derivative to find the derivative of a function.
  + (answer:)
* Given a table of values, find the indicated derivative (using the power rule, product rule, quotient rule, and or chain rule) (answers ↓)

* + Procedure: Use appropriate rule to find h’(x) in terms of f, g, f’, and g’. Plug in the given x value into your functions/derivatives. Use the table to find what these are.
* Use the product and quotient rules to find derivatives (possibly involving trigonometric functions)
  + Procedure: Specify F and G. Find F’ and G’. Plug in these 4 bits into the appropriate formula. Simplify.
  + p. 124: 1-12; 39-45
* Use the chain rule to find derivatives (possibly involving trigonometric functions)
  + Procedure: Derivative of outside function (keeping inside as is), times the derivative of inside.
  + p. 133: 7-16
* Use implicit differentiation to find dy/dx of a given function. Then, find the slope at a specified point.
  + Procedure: Use derivative as operator to both sides of function. Every term with x as only variable are done as usual.
  + Terms with a y in it require the chain rule, meaning dy/dx is multiplied to what the derivative of the y term gives you.
  + Use algebra to isolate and solve for dy/dx. Then plug in the (x,y) value of the point into this, and this is the slope of the curve.
  + P. 142: 21-28
* Find the equation of the tangent line of a function at a specified x-value.
  + Procedure: Plug in given x into given function, find y. This is your (x1, y1).
  + Find the derivative of the given function. Plug in the given x into this derivative. This value is your *m.*
  + Plug in (x1, y1) and *m* into y-y1 = m(x-x1)
  + P. 114: 53-56. (Note: these problems give you the y-value. Pretend you don’t have it when working on them).
* Find the slope of the line tangent to the function at a specified x-value.
  + Procedure: Very easy. Just take the derivative, and plug the given x-value into it. This is your answer.