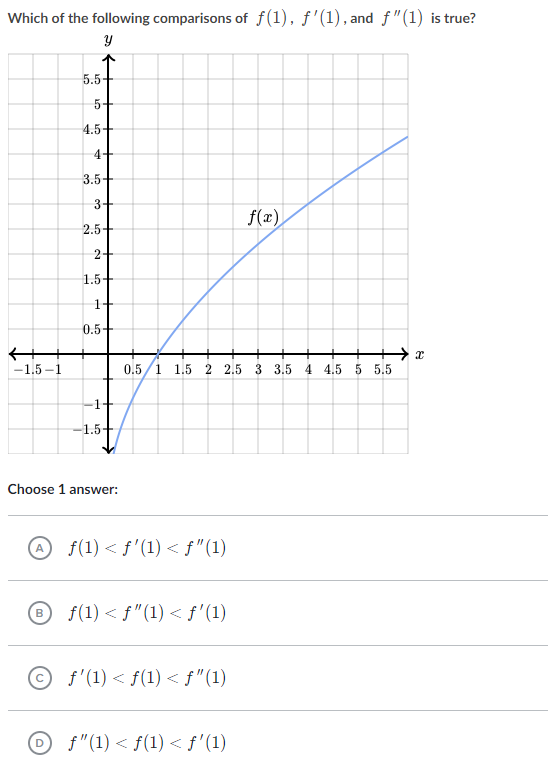
# MATH 161 Solutions: quiz v 5 October 2018

1. *[4 pts]*



*Solution:* ***D*** *is the correct answer. Note that*

*Since f is concave down over an interval that includes x = 1.*

*Next, f(1) = 0 which we can see from the graph.*

*Finally since f is increasing on an interval containing x = 1.*

1. *Given a function y = f(x) for which*

*(a) [2 pts] Find the critical points of f(x)?*

*Solution: We are given that = . Setting = 0, we find x = 0, x =4 are critical points.*

*(b) [2 pts ] Determine the interval(s) upon which f(x) is rising.*

*Solution: f(x) is rising when . Now the sign analyisis of has two transition points, x = 0 and x = 4.*

*We see that*

*(c) [3 pts] Determine the interval(s) upon which f(x) is concave up.*

*Solution: Using the product rule,*

*= = 4*

*In performing a sign analysis on we have only one transition point, viz. x =3*

*Hence f is concave up on*

1. Find an *anti-derivative* for each of the following functions. The method of *judicious* guessing is highly recommended. *Show your work.*
2. *[2 pts]* ex – 3x8

*Answer:*

1. *[2 pts]* sec2 x + 5 sec x tan x + π9

*Answer:*

*Notice that is a constant!*

1. *[2 pts]* 1 + 3x2 – 18x5

*Answer:*

1. *[2 pts]* 1 +3 ex + 4 cos x

*Answer:*

1. *[3 pts]*

*Solution: Using algebra: . Hence an antiderivative of*

1. *[3 pts]*

*Solution: Using algebra: . Hence an antiderivative of*

4. *[7 pts]* (a) Using an appropriate function and an appropriate point, estimate. Sketch!

*Solution: Let*

**

*Since*

*So the linearization of f(x) at x = 9 is given by*

*Thus our approximation of is*

*[ 3 pts]* (b) Is this an over or an underestimate? Why? (No credit for calculator answers.)

*Solution: This is an* ***underestimate*** *since the tangent line to y = f(x) at x = 9 lies below the curve. Cf. sketch above. Equivalently f(x) is concave up at x = 9 because*

