21. 0/1 points

Evaluate the difference quotient for the given function. Simplify your answer.

$$f(x) = \frac{x+7}{x+2}, \quad \frac{f(x)-f(3)}{x-3}$$

$$f(x) = \frac{x+7}{x+2}, \quad \frac{f(x)-f(3)}{x-3}$$

In general, $\dfrac{f(x)-f(c)}{x-c} = \dfrac{\frac{x+7}{x+2} - \frac{c+7}{c+2}}{x-c} =$

$$\frac{\frac{(x-7)(c+7)-(x+2)(c+7)}{(x+2)(c+2)}}{\frac{x-c}{1}} =$$

$$\frac{xc+7x-7c-49-(xc+7x+2c+14)}{(x+2)(c+2)} \cdot \frac{1}{x-c}$$

$$= \frac{cx+7x-7c-49-cx-7x-2c-14}{(x-c)(x+2)(c+2)} = \frac{-9c-63}{\sim} = -9(c+7)$$

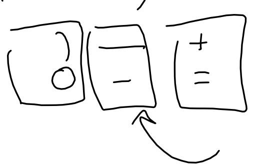
Not seeing it. Should be able to cancel the x−c!

$$f(x) = \frac{x+7}{x+2} \Rightarrow f(3) = \frac{3+7}{3+2} = \frac{10}{5} = 2$$

$$\frac{f(x)-f(3)}{x-3} = \frac{\frac{x+7}{x+2} - 2}{x-3} = \frac{\frac{x+7-2(x+2)}{x+2}}{x-3}$$

$$= \frac{x+7-2x-4}{(x+2)(x-3)} = \frac{-x+3}{(x+2)(x-3)} = \frac{-\cancel{(x-3)}}{(x+2)\cancel{(x-3)}} = \frac{-1}{x+2}$$

To enter a "−",



Section 1.4 - Approaching the tangent line by gentle intro to notion of "limit."

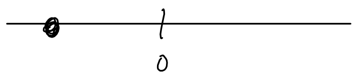
8. The displacement (in centimeters) of a particle moving back and forth along a straight line is given by the equation of motion $s = 2 \sin \pi t + 3 \cos \pi t$, where t is measured in seconds.

(a) Find the average velocity during each time period:

(i) $[1, 2]$ (ii) $[1, 1.1]$

(iii) $[1, 1.01]$ (iv) $[1, 1.001]$

(b) Estimate the instantaneous velocity of the particle when $t = 1$.



See Maple for the implementation on x^2.

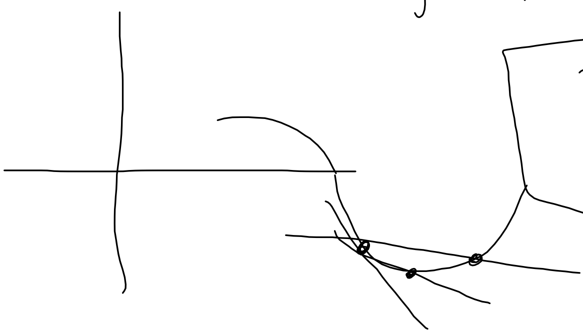
See Spreadsheet for implementation, also.

Equation of tangent line to a curve at a point.

$$y = m(x - x_1) + y_1$$

$$y = m(x - x_1) + f(x_1)$$

$$y = f'(x_1)(x - x_1) + f(x_1)$$



Tangent Slope is

$$m_{tan} = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$