2.1 – 2.4 Day before Quiz Worksheet.

Non-Calculator Questions.

1. If $f(x)=\dfrac{3x^2+x}{3x^2-x}$, then $f'(x)=$

$\dfrac{x(3x+1)}{x(3x-1)} = \dfrac{(3x-1)3-(3x+1)(3)}{(3x-1)^2}$

$= \dfrac{9x-3-9x-3}{(3x-1)^2}$

$= \dfrac{-6}{(3x-1)^2}$

A) 1 B) $\dfrac{6x^2+1}{6x^2-1}$ C) $\dfrac{-6}{(3x-1)^2}$ D) $\dfrac{-2x^2}{(x^2-x)^2}$ E) $\dfrac{36x^3-2x}{(x^2-x)^2}$

2. If the function f is continuous for all reals and if $f(x)=\dfrac{x^2-7x+12}{x-4}$ when $x\neq 4$, then $f(4)=$

$\dfrac{(x-3)(x-4)}{(x-4)}$

A) 1 B) $\dfrac{8}{7}$ C) -1 D) 0 E) undefined

3. For a function $h(t)$ to be continuous at $t=c$, what three conditions must be met?

1. ~~polynomial~~ LHL = RHL
2. function exists
3. $f(c) = \lim_{x\to c}$

$\cos(\pi/6)=\sqrt{3}/2$

4. Given $f(\theta)=\cos 2\theta$, $\left[0,\dfrac{\pi}{6}\right]$.

$\dfrac{f(0)-f(\pi/6)}{0-\pi/6} = \dfrac{1-\frac{1}{2}}{0-\pi/6} = \dfrac{1}{2}\cdot\dfrac{6}{\pi}$ f

a) Find the average rate of change over the interval.

b) Find the instantaneous rate of change at $\theta=\dfrac{\pi}{12}$.

$-2\sin 2\theta \to -2\sin(\pi/6) = -2(\frac{1}{2})$ f

c) Write the equation of the line tangent to $f(\theta)$ at $\theta=\dfrac{\pi}{12}$.

$y-\frac{\sqrt{3}}{2} = -1(x-\pi/12)$

5. Given $k(x)=\frac{1}{x}$ $k'(x)=\frac{-1}{x^2}=\frac{-1}{4}=-4$

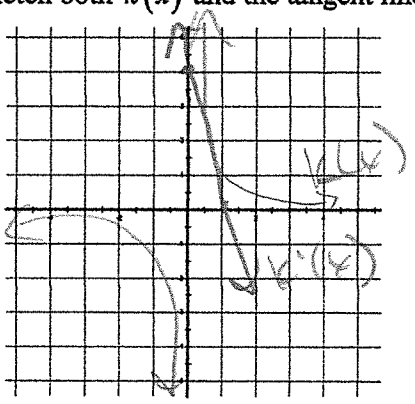
a) Write the equation of the line tangent to $k(x)$ that goes through the point $\left(\frac{1}{2},2\right)$.

$y-2=-4\left(x-\frac{1}{2}\right)$

$y-2=-4x+2$

$y=-4x+4$

b) Sketch both $k(x)$ and the tangent line.



Graphing Calculator Question.

6. Given $s(t)=-16t^2+v_0t+s_0$ for free falling objects. A silver dollar is dropped from the top of a building that is 1362 feet tall.

a) Determine the position and velocity functions for the coin. $s(t)=-16t^2+1362$ $s'(t)=-32t$

b) Determine the average velocity on the interval $[1,2]$.

c) Find the instantaneous velocities when $t=1$ and $t=2$. -32 ft/s, -64 ft/s

d) Find the time required for the coin to reach ground level. $-16t^2=-1362$

$t^2=85.125$

$t=9.226$

e) Find the velocity at impact. $-32(9.2263)$

-295.242

$\frac{f(1)-f(2)}{1-2}=\frac{1346-1298}{-1}=-48$ ft/s