Anthony Klahn

Hwk 10-1

Completed ☑
Uploaded ☐

Anthony Klahn

23. a) 190 ft/s

b) for 2 seconds

c) The rocket reached its highest point @ t=8 its velocity was Ø

d) At around 10.8 seconds, & the rocket was falling @ -90 ft/s

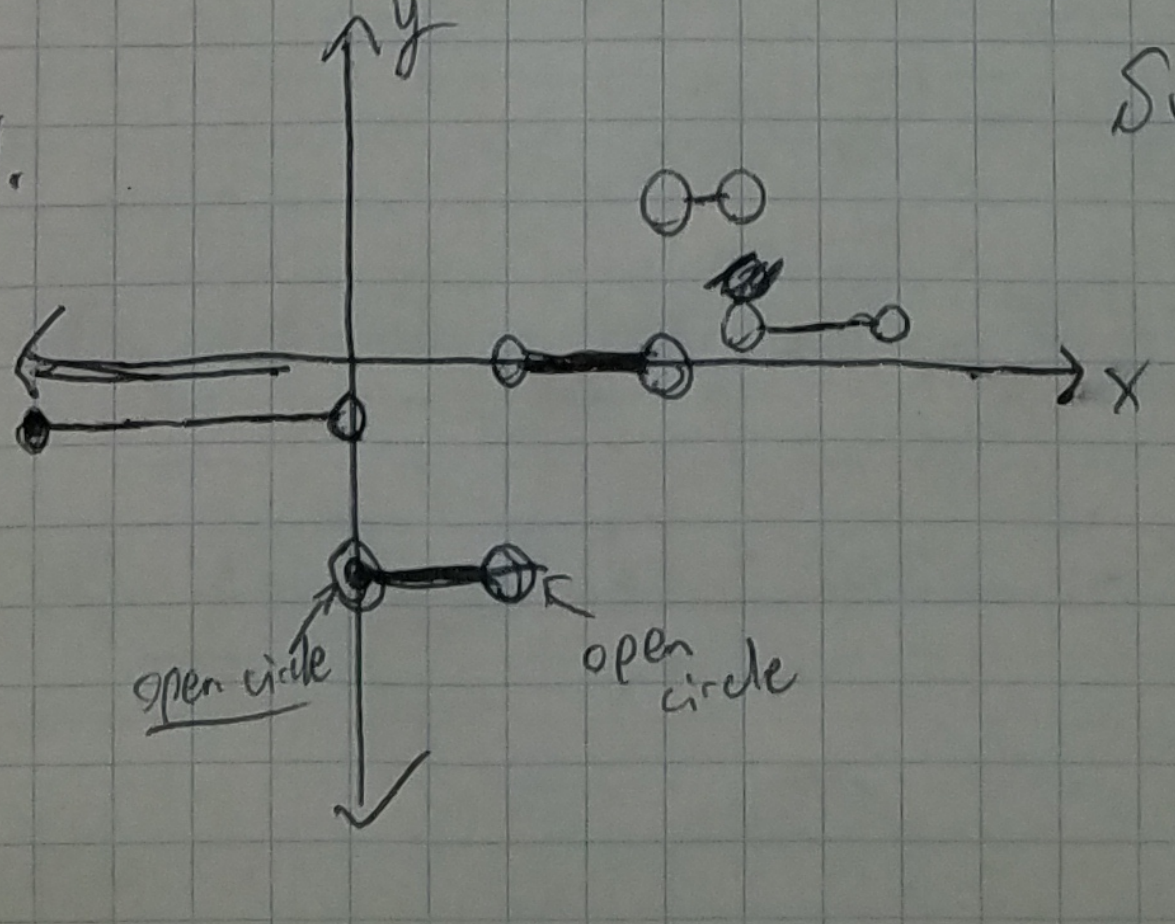
e) $10.8_s - 2_s = 8.8_s$, it fell for 8.8_s before the parachute opened.

f) The rocket's accel was greatest @ t=2 & was the constant as the rocket fell.

25. a) it is zero
b) it was 2200 rabbits
c) "rabbits/day"

27. b 28. a 29. d 30. c

31.



Such a "beatiful" derivative

Such meme very funny

Anthony Klahn

1. $y' = \boxed{1 + \sin(x)}$

3. $y' = \boxed{\frac{1}{x^2} + 5\cos(x)}$

5. $y' = \boxed{\cot(x)\csc(x) - 5}$

7. $y' = \sec x + x(-\tan x \sec x) = \boxed{\sec(x) - x\tan(x)\sec(x)}$

9. $y' = -\csc^2 x \cdot x^2 + 2x \cdot \cot(x) = \boxed{-x^2\csc^2(x) + 2x\cot(x)}$

11. $y' = (3x + x\tan x)' \rightarrow 3 + (\tan(x) + x(\sec^2 x))$

$= \boxed{3 + \tan(x) + x\sec^2(x)}$

13. $y' = \sec(x)\cos(x) + -\tan(x)\sec(x) \cdot \sin(x)$

$= \cancel{\sec(x)\cos(x)}^{1} - \tan(x)\sec(x)\sin(x)$

$1 - \frac{\sin^2 x}{\cos^2 x}$

... $\tan^2 x + 1 = \sec^2 x$ ...

$= \boxed{1 - \tan^2 x}$

$=$

Beautiful

15. $y' = \cot x(\sec^2 x) + -\csc^2 x(\tan x)$

$\frac{\cos}{\sin} \cdot \frac{1}{\cos^2} + -\frac{1}{\sin^2} \cdot \frac{\sin}{\cos} = \frac{1}{\sin \cdot \cos} - \frac{1}{\sin \cdot \cos} = \boxed{0}$

17. $y' = \frac{\cos(x) \cdot 0 - 4 \cdot -\sin(x)}{\cos^2 x} = \boxed{4\tan x \sec x}$

19. $y' = \frac{x \cdot -\sin(x) - \cos x}{x^2} = \frac{-x\sin(x) - \cos x}{x^2} = \boxed{-\frac{x\sin x + \cos x}{x^2}}$

21. $y' = \dfrac{(1+\cos x) - (x(-\sin(x)))}{(1+\cos x)^2} = \boxed{\dfrac{1+\cos x + x\sin x}{(1+\cos^2 x}}$

23. $y' = \dfrac{(1+\cot x)(-\csc^2 x) - (-\csc^2 x)(\cot x)}{(1+\cot x)^2} = -\csc^2(x)\left(\dfrac{1+\cot x - \cancel{\cot x}}{(1+\cot x)^2}\right)$

$- \csc^2 x\left(\dfrac{1}{(1+\cot x)^2}\right)$

$= \boxed{\dfrac{-\csc^2 x}{1+\cot x^2}}$

same answer

$= \boxed{\dfrac{-\csc^2 x}{(1+\cot^2 x)}}$

25. ~~[illegible]~~

$y' = -(\cot(x)\csc(x))$

$y'' = -(\csc(x) \cdot -\csc^2(x) - \cot(x) \cdot \cot(x)\csc(x))$

$= -\csc^3(x) - \cot^2\csc(x) = -\dfrac{1}{\sin^3(x)} - \dfrac{\cos^2 x}{\sin^3 x}$

$=$

$= \boxed{-\dfrac{1+\cos^2 x}{\sin^3 x}}$

& for problems 1 → 25 the diff. btwn nDeriv (y(x)) & y'(x) is nDeriv is much more inaccurate than y(x) due to the fact it is an APPROXIMATION

27. $\boxed{y = x}$ Cmon, we all now $\sin(\theta) = \theta$ for small vals of θ (& I mean this is where that & newton's method of approx. come from.)

tan line @ x=0 for sin(x)

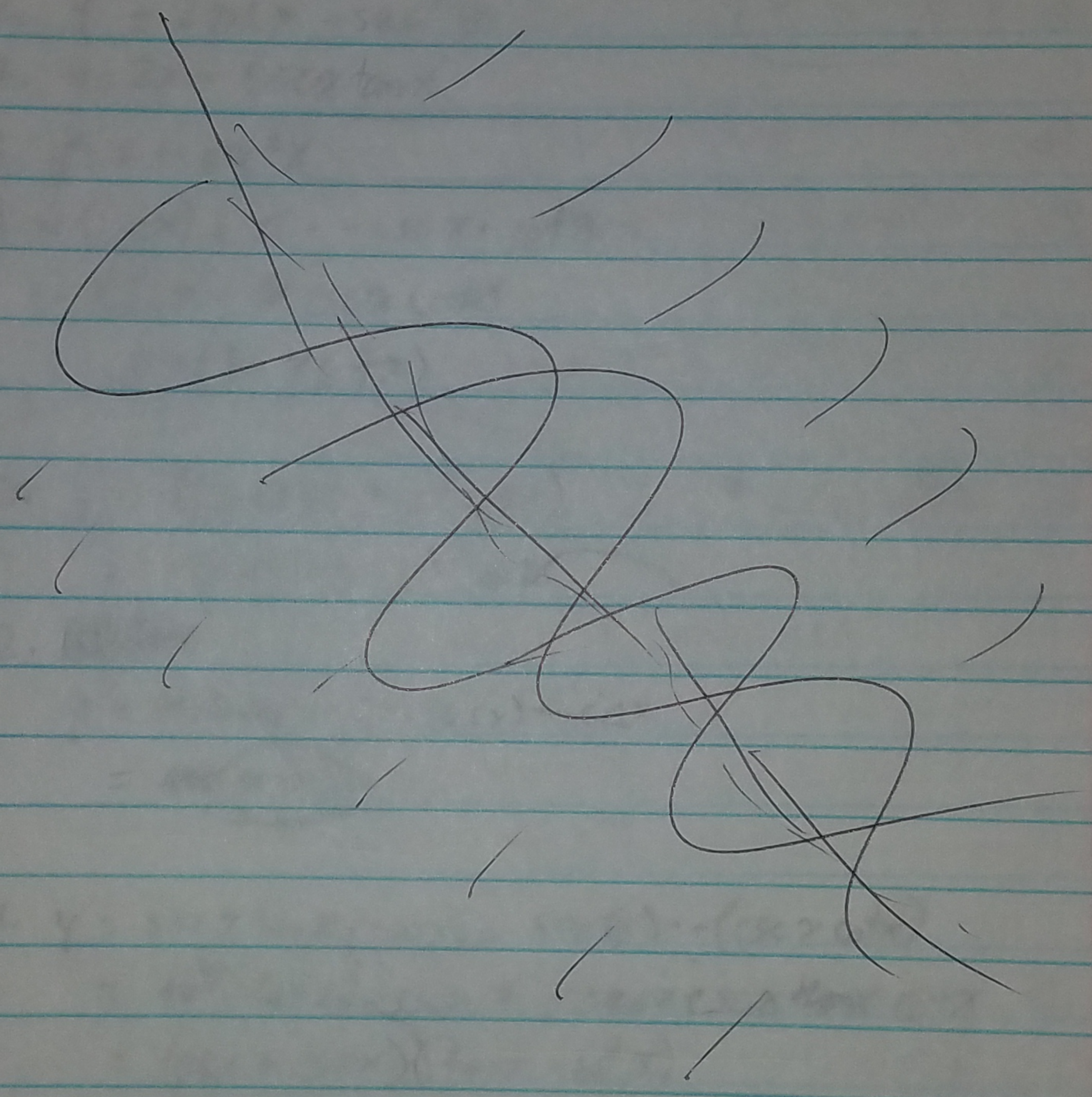
although Newton's approx is just a worse Taylor Maclaurin series

$y = \sin(x)$ $y' = \cos(x)$

$y = \cos(0)(x+0) + \cancel{\sin(0)}$ 0

$y = 1x = x$

10-2



Homework 10-2

A

$x^3 dx$

B

18. $y' = -\csc^2 x$ $\quad y = 5 + \cot x$

20. $y = 2\sin x - \cos x \quad \boxed{y' = 2\cos x + \sin x}$

22. $y = \tan x + 1 \quad y' = \sec^2 x$

24. $y = \cos x + \cot x \quad y' = -\sin x - \csc^2 x$

26. a) $y = \sin x \quad y' = \cos x \quad y'' = -\sin x \quad y''' = -\cos x \quad y'''' = \sin x$

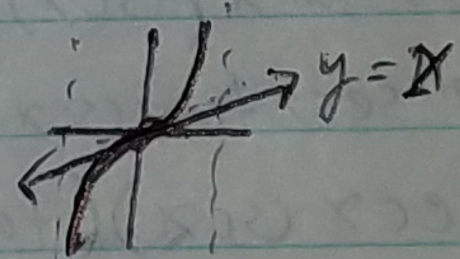
b) $y = \cos x \quad y^{(4)} = \cos x$

$y^{(3)} = \sin x$

$y^{(2)} = -\cos x$

$y^{(1)} = -\sin x$

28. $y = \tan x \quad y' = \sec^2 x$



$y(0) = 0$

$y'(0) = 1$

$y_{tang} = 0 + x$

$\boxed{y_{tang} = x}$

Calc BC 10-2 Class/Homework Anthony [illegible]

2. $y' = 2\cos x - \sec^2 x$

4. $y = 2x - \sec x \tan x$

6. $y' = 2t - \csc^2 x$

8. $y' = 1(\csc x) + x \cdot -\csc x \cdot \cot x$

$y' = \csc x - x \csc x \cot x$

$= \csc x(1 - x\cot x)$

10. $y' = -(2x\sin x + x^2\cos x)$

$= -2x\sin x - x^2\cos x$

12. ~~cos~~

$y' = \cancel{(1)(\sin x)} + (x)(\cos x) \cancel{- \sin x}$

$= \cancel{\sin x}\ x\cos x$

14. $y' = \sec x \tan x(\csc x) + \sec(x) \cdot -(\csc x \cot x)$

$= \sec x \cancel{\tan x} \csc x + - \sec x \csc x \cancel{\tan x} \cot x$

$= (\sec x \csc x)(\tan x - \cot x)$

~~16. $y' = \sin x(1+\sec x) + \cos(x) \cdot (\sec x \tan x)$~~

~~$= \sin x + \tan x + \sin x$~~

~~$= \tan x$~~

16. $y = \cos(x)(1 + \sec x)$ $\quad y' = -\sin x(1 + \cancel{\sec x}^{\frac{1}{\cos x}}) + \cos(x) \cdot (\cancel{\sec x \tan x}^{\frac{1}{\cos x} \cdot \frac{\sin x}{\cos x}})$

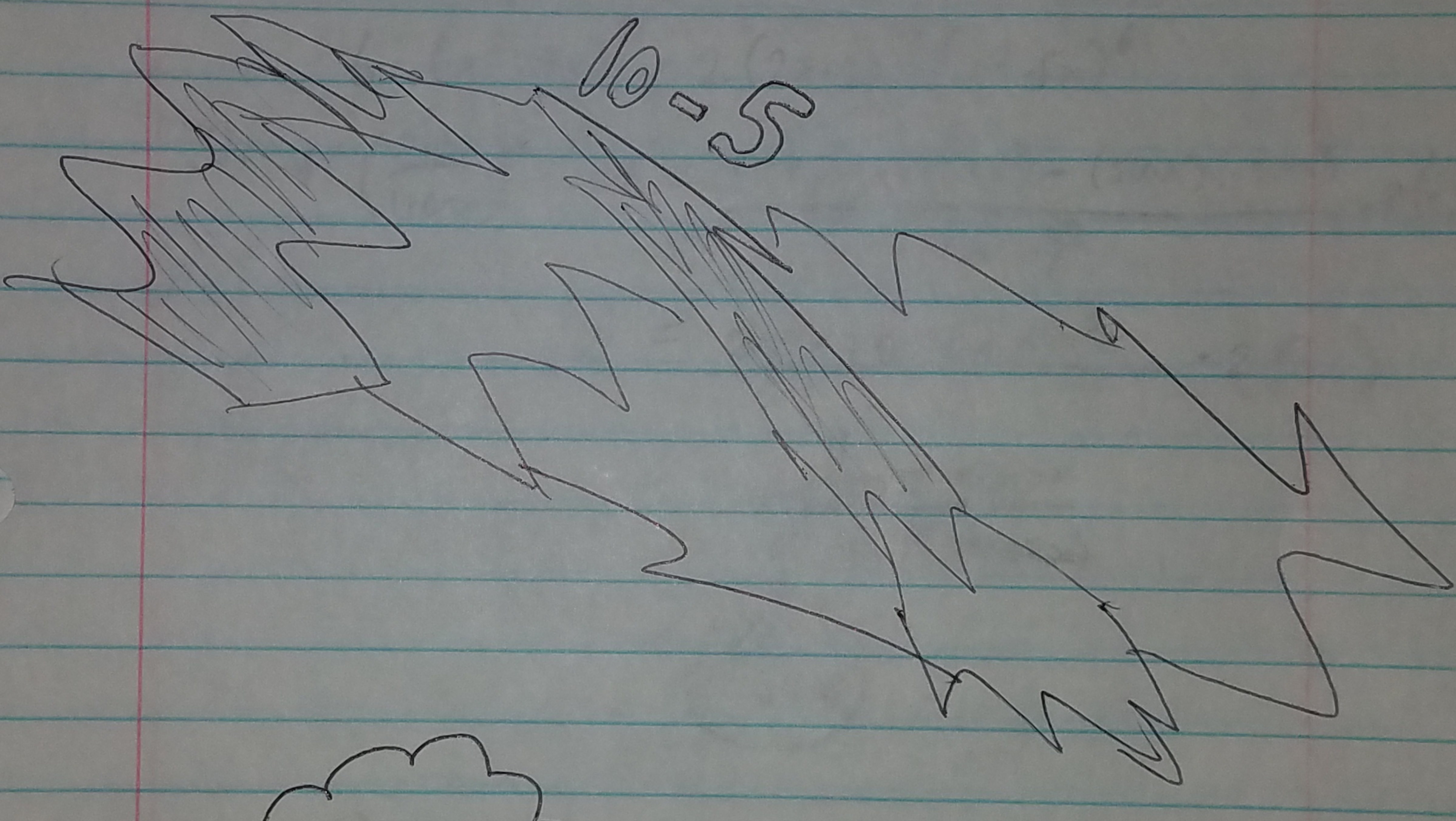
$= -\sin x - \tan x + \frac{\cancel{\cos x} \cdot \sin x}{\cancel{\cos x} \cdot \cos x}$

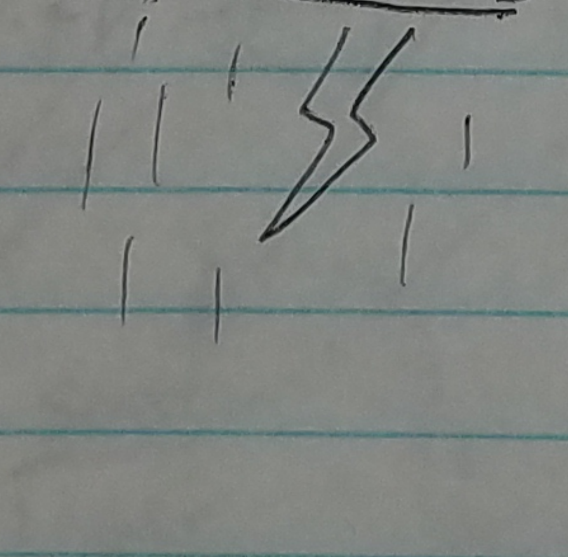
$= -\sin x \cancel{- \tan x + \tan x}$

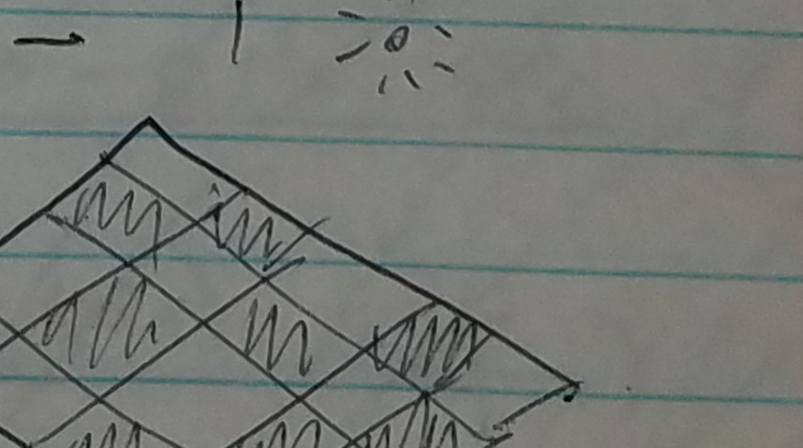
$= -\sin x$

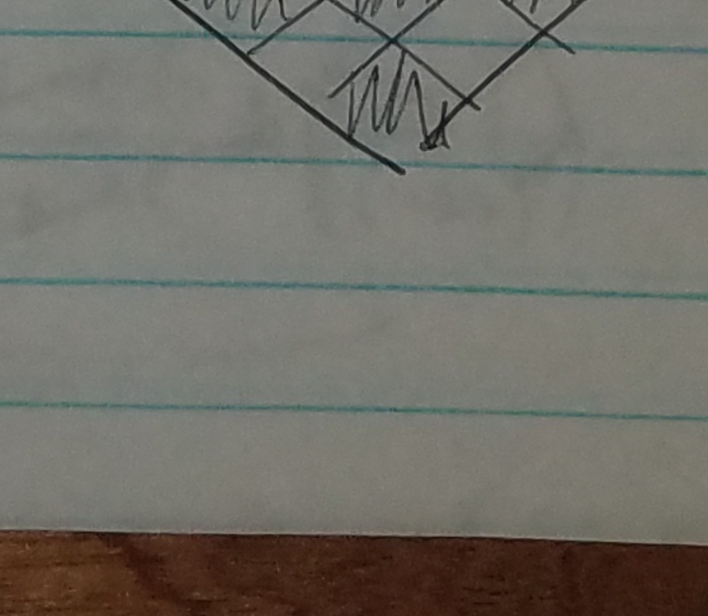
Homework

10-5









Calc BC HWK 10/5

30. $y=(2x-5)^{-1}(x^2-5x)^6$

~~dL=~~ ~~dL=~~

$dR=(2x-5)(6(x^2-5x)^5)$ $dL=-2(2x-5)^{-2}$

$y'=\cancel{(2x-5)}\cancel{(2x-5)}(6\cdot(x^2-5x)^5)+-2(2x-5)^{-2}\cdot(x^2-5x)^6$

$6\cdot(x^2-5x)^5-2(2x-5)^{-2}(x^2-5x)^6$

31. $y=\left(\frac{\sin x}{1+\cos x}\right)^2$ $y'=\frac{(1+\cos x)(\cos x)-(\sin x)(-\sin x)}{(1+\cos x)^2}\cdot 2\left(\frac{\sin x}{1+\cos x}\right)$

$=\frac{\cos^2 x+\cos x+\sin^2 x}{\ldots}\cdot 2(\ldots)$

$=\frac{\cancel{1+\cos x}\ 1\cdot 2\sin x}{(1+\cos x)^{\cancel{2}}\cdot\cancel{(1+\cos x)}}$

$=\frac{2\sin x}{(1+\cos x)^2}$

32. $\cancel{y=\left(\frac{1+\cos x}{\sin x}\right)^{-1}}$ $y'=\cancel{\frac{(\sin x)(-\sin x)-(1+\cos x)(\cos x)}{\sin^2 x}}\cdot -1\left(\frac{1+\cos x}{\sin x}\right)^{-2}$

$=\cancel{\frac{-\sin^2 x-\cos^2 x-\cos x}{}}\cdot(\ldots)$

$=\cancel{\frac{-1(1+\cos x)}{}}\cdot\cancel{-1}(\ldots)$

$\left(\frac{\sin x}{1+\cos x}\right)^2$

$=\frac{\cancel{(1+\cos x)}}{\cancel{\sin^2 x}}\cdot\left(\frac{(\sin x)^{\cancel{2}}}{(1+\cos x)^{\cancel{2}}}\right)$

$y'=\frac{\sin x}{1+\cos x}$

32. $y = \left(\frac{1+\cos x}{\sin x}\right)^{-1} \rightarrow \frac{\sin x}{1+\cos x}$

$$y' = \frac{(1+\cos x)(\cos x) - (\sin x)(-\sin x)}{(1+\cos x)^2}$$

$$= \frac{\cos^2 x + \sin^2 x + \cos x}{(1+\cos x)^2} = \frac{\cancel{1+\cos x}}{(1+\cos x)^{\cancel{2}}} = \frac{1}{1+\cos x}$$

33. $\frac{(x-1)^3}{x^3} = y$

$\rightarrow y = \left(\frac{x-1}{x}\right)^3$

$$y' = \cancel{\frac{x-1 \ x(x+1)(x)}{x^2}} \left[3 \cdot \left(\frac{x-1}{x}\right)^2\right]$$

$$\frac{1}{x^2}\left(3 \cdot \frac{(x-1)^2}{x^2}\right)$$

$\rightarrow y' = \boxed{\frac{3}{x^2} \cdot \left(\frac{x-1}{x}\right)^2}$

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

$y' = \frac{2}{1}\left(\frac{x}{x-1}\right) \cdot \frac{\cancel{(x-1)(1)} - \cancel{(x)(1)}}{(x-1)^2} = \frac{-2x}{(x-1)^3}$

35. $y = \sin^3 x \tan 4x$

$dr = 4\sec^2(4x)$ $dL = 3\sin^2 x \cdot \cos x$

$\boxed{y' = \sin^3 x \cdot 4\sec^2 4x + 3\sin^2 x \cdot \cos x \cdot \tan 4x}$

36. $y = \cos^4 x \cdot \cot 7x$

$(\cos x)^4$

$dR = -(7 \cdot \csc^2(7x))$ $dL = 4(\cos x)^3 \cdot -\sin(x)$

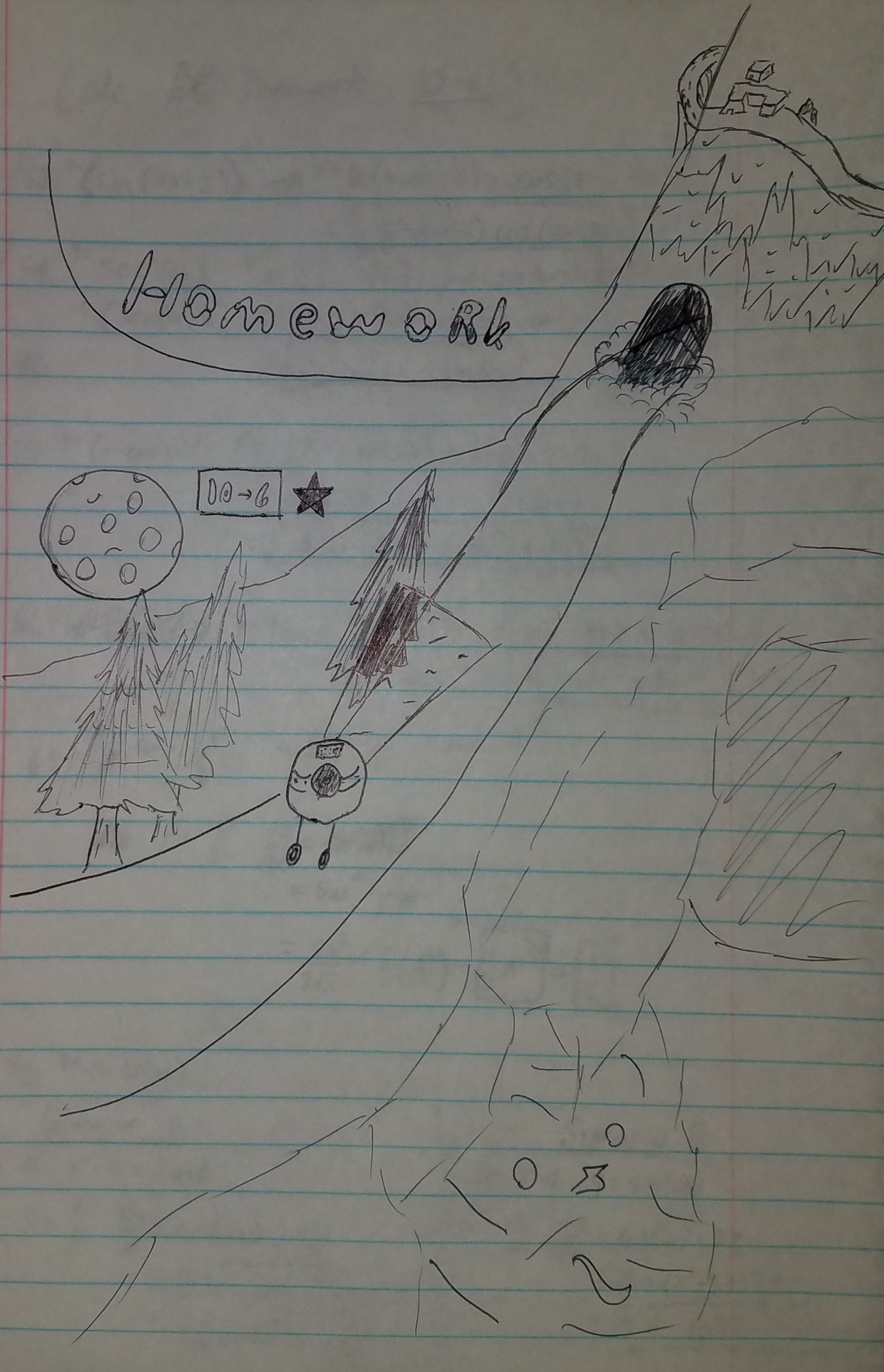
$y' = (\cos x)^4 \cdot (-7\csc^2(7x)) + \cot 7x \cdot 4(\cos x)^3 \cdot -\sin(x)$

37. $y' = \frac{1}{2\sqrt{\sin x}} \cdot \cos x$

If you graph both graphs (nDer(y) & y')
you will see they overlap...

38. $\boxed{y' = \frac{-\sin x}{2\sqrt{\cos x}}}$

39. $y' = \frac{4(\sec x \tan x + \sec^2 x)}{2\sqrt{\sec x + \tan x}} = \boxed{\frac{2(\sec x \tan x + \sec^2 x)}{\sqrt{\sec x + \tan x}}}$


Homework
10→6

Calc BC Homework 10-6

✓ 53. $y = (\sin(3x-2))^2 \rightarrow y' = 2(\sin(3x-2) \cdot \cos(3x-2) \cdot 3)$

$= \boxed{6\sin(3x-2)\cos(3x-2)}$

✓ 54. $y = \sec^2(5x)$ $\quad y' = 2[\sec(5x)] \cdot (\sec 5x \tan 5x) \cdot 5$

$= (\sec(5x))^2$ $\quad = 10\sec(5x)\sec(5x)\tan(5x)$

$= \boxed{10 \cdot \sec^2 5x \cdot \tan 5x}$

✓ 55. $y = (1+\cos 2x)^2$ $\quad y' = 2(1+\cos 2x) \cdot -\sin(2x) \cdot 2$

$= \ldots$ $\quad = 4(1+\cos 2x) \cdot -\sin(2x)$

$= \boxed{-4\sin(2x) \cdot (1+\cos(2x))}$

✓ 61. $y = \tan x$ $\quad y' = \sec^2 x$ $\quad y'' = 2 \cdot \sec x \cdot \sec x \tan x$

$= (\sec x)^2$ $\quad = \boxed{2\sec^2 x \tan x}$

✓ 65. $f(u) = u^5 + 1$ $\quad u = g(x) = \sqrt{x}$ $\quad x = 1$

$f' = \frac{dy}{du} \cdot \frac{du}{dx} =$

$= 5u^4 \cdot \frac{1}{2\sqrt{x}}$

$= \frac{5x^2}{2\sqrt{x}} = \frac{5}{2}\left(\frac{x^2}{x^{1/2}}\right) = \boxed{\frac{5}{2}x^{3/2}} = \boxed{\frac{5}{2}}$

✓ 72. $y = \sin(x^2+1)$

Scenario a

$u = x^2$ $\quad y = \sin(u+1)$

$y' = \frac{dy}{du} \cdot \frac{du}{dx} = \cos(u+1) \cdot 1 \cdot 2x$

$= \cos(x^2+1) \cdot 2x$

$= \boxed{2x \cdot \cos(x^2+1)}$

Scenario B

$u = x^2+1$ $\quad y = \sin(u)$

$y' = \frac{dy}{du} \cdot \frac{du}{dx} = \cos(u) \cdot 2x$

$= \cos(x^2+1) \cdot 2x$

$= \boxed{2x \cdot \cos(x^2+1)}$

82. a) ~~5f(x) - g(x) = a(x)~~

$a = 5f - g \quad a' = 5f' - g' \quad [x=1]$

$a'(1) = 5(-1/3) - (-8/3) = \frac{-5+8}{3} = 1$

b) $y = fg^3 \quad y' = f\cdot(3g^2\cdot g') + f'\cdot g^3 ; [x=0]$

$= 1\cdot(3\cdot\frac{1}{3}) + 5(1)$

$= 1 + 5 = \boxed{6}$

c) $y = \frac{f(x)}{g(x)+1} \quad y'(x) = \frac{[g(x)+1]\cdot f'(x)] - [f(x)\cdot g'(x)]}{[g(x)+1]^2} \quad [x=1]$

$y'(1) = \frac{(-4+1)(-1/3) - (3)(-8/3)}{9} = \frac{(-3)(-1/3) + 8}{9} = 1$

d) $y = f(g(x)) \quad y' = f'(g(x))\cdot g'(x) \quad [x=0]$

$y'(0) = f'(g(0))\cdot g'(0)$

$= -1/3 \cdot 1/3 = -1/9$

e) $y = g(f(x)) \quad y' = g'(f(x))\cdot f'(x) \quad [x=0]$

$y'(0) = -\frac{8}{3}\cdot 5 = \frac{-40}{3}$

Calc BC HWK 10-6 Anthony Klalm

82.

f) $y = (g(x) + f(x))^{-2}$ $y' = -2(g(x)+f(x))^{-3} \cdot (g'(x) + f'(x))$ [x=1]

$y'(1) = -2(\cancel{3} \overset{-1}{} \cancel{4})^{-3} \cdot (\cancel{\tfrac{1}{3}} + \cancel{\tfrac{-8}{3}})$

$\cancel{\tfrac{9}{3}}$

-3

$= -2(-1) \cdot -3 = -6$

g) $y = f(x+g(x))$ $y' = f'(x+g(x)) \cdot (1 + g'(x))$ [x=0]

$y'(0) = f'(\overset{1}{\cancel{g(0)}}) \cdot (1+g'(0))$

$= -\frac{1}{3} \cdot (\frac{4}{3})$

$= -4/9$