Name____________
er Order Derv. – Product & Quotient Rules Date_____________

wer rule, find the second derivative of the given function.

$x^6 - 5x^3 - 4x^2 + 3x - 5$

oduct rule, find the second derivative of the given function. Do not
er derivative.

$x^2 + 2x)(4x^4 - 2x^3)$

otient rule, find the second derivative of the given function. Simplify each

$\frac{x^2 + x}{x^3}$

n #3, find the equation of the tangent line when $x = 1.75$.

Name____________

Date______________

igher Order Derv. – Product & Quotient Rules

: power rule, find the second derivative of the given function.

$= 3x^6 - 5x^3 - 4x^2 + 3x - 5$

$) = 18x^5 - 15x^2 - 8x + 3$

$) = 90x^4 - 30x - 8$

: product rule, find the second derivative of the given function. Do

:ither derivative.

$= (3x^2 + 2x)(4x^4 - 2x^3)$

$f'(x) = (6$

tient rule, find the second derivative of the given function. Simplify each

$\frac{^2 + x}{x^3}$ $g'(x) = \dfrac{x^3(6x+1) - (3x^2+x)\cdot 3x^2}{x^6} = \dfrac{6x^4+x^3-9x^4-3x^3}{x^6}$

$= \dfrac{^-3x^4-2x^3}{x^6} = \boxed{\dfrac{^-3x-2}{x^3} = g'(x)}$

$g''(x) = \dfrac{x^3(^-3) - (^-3x-2)\cdot 3x^2}{x^6} = \dfrac{^-3x^3+9x^3+6x^2}{x^6}$

$= \dfrac{6x^3+6x^2}{x^6} = \boxed{\dfrac{6x+6}{x^4} = g''(x)}$

n #3, find the equation of the tangent line when $x = 1.75$.

$y = mx+b$

$g'(1.75) = \dfrac{^-3(1.75)-2}{1.75^3} = {^-1.35} = m$

$2.04 = {^-1.35}(1.75$

$b = 4.40$

$g(1.75) = \dfrac{3(1.75)^2+1.75}{1.75^3} = 2.04$

$(1.75, 2.04)$

$\boxed{y = {^-1.35}x + 4.4}$

Name ____________________

Derivatives of Trig Functions Block ____________ Date ___

unctions

$$D_x(\sin x) = \cos x \qquad D_x(\cos x) = -\sin x$$

of tan, sec, csc, cot

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

$$= \frac{1}{\cos^2 x} = \boxed{\sec^2 x}$$

$$D_x = \left(\frac{1}{\sin x}\right) = \frac{\cancel{\sin x \cdot 0} - 1 \cdot \cos x}{\sin^2 x} = \frac{-\cos x}{\sin^2 x}$$

$$= \frac{-\cos x}{\sin x} \cdot \frac{1}{\sin x} = \boxed{-\cot x \cdot \csc x}$$

$$D_x = \left(\frac{1}{\cos x}\right) = \frac{\cancel{\cos x \cdot 0} - 1 \cdot (-\sin x)}{\cos^2 x} = \frac{\sin x}{\cos^2 x}$$

$$= \frac{\sin x}{\cos x} \cdot \frac{1}{\cos x} = \tan x \cdot \sec x$$

$$D_x = \left(\frac{\cos x}{\sin x}\right) = \frac{\sin x \cdot (-\sin x) - \cos x \cdot \cos x}{\sin^2 x}$$

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

$$= \frac{-1}{\sin^2 x} = \boxed{-\csc^2 x}$$

1

Derivatives of Trig Functions

$y=4$

$(\sin x) = \cos x$ $\quad d(\csc x) = -\csc x \cot x$

$(\cos x) = -\sin x$ $\quad d(\sec x) = \sec x \tan x$

$(\tan x) = \sec^2 x$ $\quad d(\cot x) = -\csc^2 x$

$\frac{dy}{dx}$ if $y = 4\sin x$.

$\boxed{y' = 4 \cdot \cos x}$

2) Find $f'(x)$ if $f(x) = 3$

$\boxed{f'(x) = -3\sin}$

dy if $y = \cos x \sin x$.

$y' = -\sin x \cdot \sin x + \cos x \cdot \cos x$

$y' = -\sin^2 x + \cos^2 x$

4) $D_x(9x^2 \cot x) =$

$18x \cdot \cot x + 9x^2 \cdot (-\csc^2 x$

$18x \cot x - 9x^2 \csc^2 x$

$= \sin x \sec x$

$s \cdot \sec x + \sin x \cdot \sec x \cdot \tan x$

$\sin x \cdot \sec x \cdot \tan x$

6) Find dy if $y = \frac{\sin x}{x}$

$$y' = \frac{x \cdot \cos x - \sin x \cdot 1}{x^2}$$

$$y' = \frac{x \cos x - \sin x}{x^2}$$

$f(x) = (12x^7 + 6)\cos x$

$24x^6 \cdot \cos x - (12x^7+6) \cdot (-\sin x)$

$84x^6 \cos x + (12x^7+6)\sin x$

8) Find $f'(x)$ if $f(x) = 8x^3 \sec x$

$f'(x) = 24x^2 \cdot \sec x + 8x^3 \cdot \sec x \cdot$

$= x - 4\csc x + 2\cot x$

$y' = 1 + 4\csc x\cot x - 2\csc^2 x$

$s(t) = \dfrac{3x+2}{\sec x}$

10) Find $g'(x)$ if $g(x) = \left(5x^6 - 2x^2\right)\csc x$

$g'(x)\ (30x^5 - 4x)\csc x + (5x^6 - 2x^2)$

$y' = 1\cdot\cos x + x(-\sin x)$

12

$y' = \cos x - x\sin x$

$y'' = -\sin x - (1\cdot\sin x + x\cos x)$

$y'' = -\sin x - \sin x - x\cos x$

12) Find d^2y for $y = x\cos x$

$\boxed{y'' = -2\sin x - x\cos x}$

if $f(x) = \sin x\left(\sqrt[4]{x^3} - \frac{2}{x^3}\right)$

14) Find $f''(x)$ if $f(x) = \frac{3\cos x}{x}$.

pes of the tangent lines at $x = \frac{\pi}{4}$ and $x = \frac{3\pi}{5}$ if $f(x) = \sec x \tan x$.

lue of x when the slope of the tangent is equal to 3 for $y = x^3 - 5\sin x$.