Sheet #367

NAME KEY Period: ___

THREE DIFFERENTIATION QUESTIONS

INSTRUCTIONS: START WITH THE QUESTION THAT IS CIRCLED ON YOUR SHEET. THEN SHARE WITH THE STUDENTS IN YOUR GROUP. THEY STARTED TO WORK ON DIFFERENT QUESTIONS.

1. $f(x) = (2x-1)^4$. FIND THE EQUATION OF THE LINE THAT IS TANGENT TO $f(x)$ AT $x=1$.

Use point-slope form

$y - K = m(x-H)$

$y - f(1) = f'(1)(x-1)$

$f(1) = (2\cdot 1 - 1)^4 = 1^4 = 1$

$f'(x) = 4(2x-1)^3 \cdot 2$ ← by chain rule, $\frac{d}{dx}(2x) = 2$.

$f'(1) = 4\cdot(1)^3\cdot 2 = 8$

$\boxed{y-1 = 8(x-1)}$ or $y = 8x - 7$.

2. $y = \sin(e^{2x})$. Find y'.

CHAIN RULE:

$\frac{d}{dx} f(g(x)) = f'(g(x))\cdot g'(x) = \cos\left(e^{2x}\right)\cdot e^{2x}\cdot 2$

$= \boxed{2e^{2x}\cos(e^{2x})}$

DECOMPOSE

	FUNCTION	DERIVATIVE
OUTER	$f = \sin x$	$f' = \cos x$
INNER	$g = e^{2x}$	$g' = e^{2x}\cdot 2$

← $\frac{d}{dx}(2x) = 2$ BY CHAIN RULE

3. $y = \sin(3x)$. Find y''.

FIND y' WITH CHAIN RULE

$y' = \cos(3x)\cdot 3$

TAKE SECOND DERIVATIVE

$y'' = \frac{d}{dx}\left[3\cos(3x)\right]$

$= 3(-\sin(3x)\cdot 3)$

$= \boxed{-9\sin(3x)}$