SCORE: ___ / 30 POINTS

NO CALCULATORS ALLOWED
SHOW PROPER WORK / USE PROPER NOTATION / SIMPLIFY YOUR ANSWERS

If $f(x) = (5-2x)^3(1-x^2)^{-2}$, find $f'(x)$. Your final answer should be in factored simplified form.   SCORE: ___ / 5 POINTS

SEE VERSION A KEY

Find the slope of the tangent line to $(x^2+y^3)^2 = 1-2x^2y^3$ at $(2,-1)$.   SCORE: ___ / 5 POINTS

SEE VERSION A KEY

If $f(x) = (4+5x)^{\tan x}$, find $f'(x)$.   SCORE: ___ / 5 POINTS

$$\ln f(x) = \tan x \ln(4+5x)$$

$$\frac{f'(x)}{f(x)} = \sec^2 x \ln(4+5x) + \tan x \frac{5}{4+5x}$$

$$f'(x) = f(x)\left(\sec^2 x \ln(4+5x) + \frac{5\tan x}{4+5x}\right)$$

$$= (4+5x)^{\tan x}\left(\sec^2 x \ln(4+5x) + \frac{5\tan x}{4+5x}\right)$$

$$= (4+5x)^{\tan x - 1}\left((4+5x)\sec^2 x \ln(4+5x) + 5\tan x\right)$$

➡

Find $\dfrac{d}{dx}\sin^{-1}\sqrt{x}$.

SEE VERSION A KEY

Prove that $\dfrac{d}{dx}\tan^{-1}x = \dfrac{1}{1+x^2}$.

SCORE: ___ / 4 POINTS

SEE VERSION A KEY

The amount you pay for car insurance every year depends on how many miles you drive each day. If $p = f(d)$, **SCORE: ___ / 3 POINTS**
where p is your yearly payment (in dollars), and v is your daily driving (in miles), what does the statement $f'(20) = 3$ mean ?
Give the units of measurement for each number in your answer.
NOTE: Your answer should NOT include "derivative", "instantaneous", "rate of change", "with respect to", "slope" or "tangent line".

SEE VERSION A KEY

The table below shows values of $f(x)$, $f'(x)$, $g(x)$ and $g'(x)$ for several values of x.   **SCORE: ___ / 4 POINTS**
If $h(x) = g(f(x))$, find $h'(-2)$.

x	−3	−2	−1	0	1	2	3
$f(x)$	2	−1	−3	−2	3	1	0
$f'(x)$	−1	3	4	−2	−3	−1	2
$g(x)$	−1	3	1	−2	0	−3	2
$g'(x)$	4	−3	−2	3	−1	2	1

$h'(x) = g'(f(x)) \cdot f'(x)$

$h'(-2) = g'(f(-2)) \cdot f'(-2)$

$\qquad = g'(-1) \cdot 3$

$\qquad = (-2)3$

$\qquad = -6$