

SCORE: \_\_\_\_ / 30 POINTS

**NO CALCULATORS ALLOWED**

**SHOW PROPER WORK / USE PROPER NOTATION / SIMPLIFY YOUR ANSWERS**

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  $f(x) = (3 + 4x)^{\tan x}$ , find  $f'(x)$ .

SCORE: \_\_\_\_ / 5 POINTS

$$\ln f(x) = \tan x \ln(3 + 4x)$$

$$\frac{f'(x)}{f(x)} = \sec^2 x \ln(3 + 4x) + \tan x \frac{4}{3 + 4x}$$

$$f'(x) = f(x) \left( \sec^2 x \ln(3 + 4x) + \frac{4 \tan x}{3 + 4x} \right)$$

$$= (3 + 4x)^{\tan x} \left( \sec^2 x \ln(3 + 4x) + \frac{4 \tan x}{3 + 4x} \right)$$

$$= (3 + 4x)^{\tan x - 1} \left( (3 + 4x) \sec^2 x \ln(3 + 4x) + 4 \tan x \right)$$

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

SCORE: \_\_\_\_ / 5 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  $x$ .  
 If  $h(x) = g(f(x))$ , find  $h'(-1)$ .

SCORE: \_\_\_ / 4 POINTS

$x$	-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

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

$$h'(-1) = g'(f(-1)) \cdot f'(-1)$$

$$= g'(-3) \cdot 4$$

$$= 4 \cdot 4$$

$$= 16$$

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

SCORE: \_\_\_ / 4 POINTS

SEE VERSION A KEY

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

SCORE: \_\_\_ / 4 POINTS

SEE VERSION A KEY