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Practice quiz onTangent Lines to Functions

PUNTOS TOTALES DE 2

1. Suppose that $f : \mathbb{R} \to \mathbb{R}$ is a function. Which of the following expressions corresponds to $f'(2)$, the slope of the tangent line to the graph of $f(x)$ at $x = 2$?

1 / 1 puntos

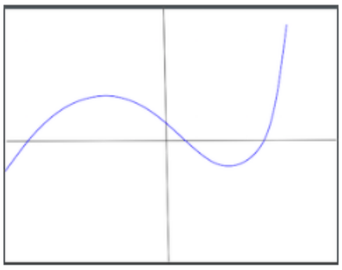
- ○ $f'(2) = mx + b$
- ◉ $f'(2) = \lim_{h \to 0} \frac{f(2+h) - f(2)}{h}$
- ○ $f'(2) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$
- ○ $f'(2) = 2$

Correcto

This expression can be obtained from the first screen of our video by plugging in 2 for a.

2. Suppose that $h : \mathbb{R} \to \mathbb{R}$ is a function whose graph is shown as the blue curve in the figure. For how many values of a is $h'(a) = 0$?

1 / 1 puntos



- ○ 3
- ○ Never
- ○ Always
- ◉ 2

Correcto

$h'(a)$ gives the slope of the tangent line to the graph of h at the point $x = a$.

When $h'(a) = 0$, this means that the tangent line is horizontal.

There are two places (one on each side of the y-axis) where this tangent line is horizontal, so this answer is correct.

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Practice quiz on Exponents and Logarithms

PUNTOS TOTALES DE 12

1. Re write the number $784 = 2 \times 2 \times 2 \times 2 \times 7 \times 7$ using exponents.

1 / 1 puntos

- $(16^4)(49^2)$
- $(2^6)(7^6)$
- $(2 \times 7)^6$
- $(2^4)(7^2)$

Correcto

For this type of problem, count the number of times each relevant factor appears in the product. That number is the exponent for that factor.

2. What is $(x^2 - 5)^0$?

1 / 1 puntos

- (x^2)
- -4
- 1
- $(x^2) - 5$

Correcto

Any real number (except zero) raised to the"zeroith" power $= 1$.

3. Simplify $((x-5)^2)^{-3}$

1 / 1 puntos

- $(x-5)$
- $(x-5)^{-1}$
- $(x-5)^{-5}$
- $(x-5)^{-6}$

Correcto

By Rule 2, "Power to a Power," multiply the exponents and get:

$$(x-5)^{(2\times -3)} = (x-5)^{-6}$$

By the definition of negative exponents, this is equal to $\dfrac{1}{(x-5)^6}$

4. Simplify $(\frac{8^2}{8^7})^2$

1 / 1 puntos

- ( ) 8^{-4}
- (•) 8^{-10}
- ( ) 8^{-5}
- ( ) 8^{-1}

Correcto

We can first simplify what is inside the parenthesis to 8^{-5}using the Division and Negative Powers Rule.

Then apply division and negative powers-- the result is the same. $\frac{8^4}{8^{14}} = 8^{-10}$

5. $\log 35 = \log 7 + \log x$

1 / 1 puntos

Solve for x

- ( ) 4
- (•) 5
- ( ) 7
- ( ) 28

Correcto

$\log(x) = \log 35 - \log 7$

$\log(x) = \log\ (\frac{35}{7})$

By the Quotient Rule $\log x = \log 5$

6. $\log_2(x^2+5x+7)=0$

1 / 1 puntos

Solve for x

- ○ $x=2$
- ○ $x=2$ or $x=3$
- ○ $x=3$
- ◉ $x=-2$ or $x=-3$

Correcto

We use the property that $b^{\log_b a}=a$

Use both sides as exponent for 2.

$2^{\log_2 x^2+5x+7}=2^0$

$x^2+5x+7=1$

$x^2+5x+6=0$

$(x+3)(x+2)=0$

$x=-3$ OR

$x=-2$

7. Simplify $\log_2 72-\log_2 9$

1 / 1 puntos

- ○ $\log_2 4$
- ○ 4
- ◉ 3
- ○ $\log_2 63$

Correcto

By the quotient rule, this is $\log_2 \frac{72}{9}=\log_2 2^3=3$

8. Simplify $\log_3 9-\log_3 3+\log_3 5$

1 / 1 puntos

- ○ $\log_3 8$
- ○ 15
- ○ 8
- ◉ $\log_3 15$

Correcto

By the Quotient and Product Rules, this is $\log_3 \frac{9\times 5}{3}=\log_3 15$

9. Simplify $\log_2(3^8 \times 5^7)$

1 / 1 puntos

- (selected) $(8 \times \log_2 3) + (7 \times \log_2 5)$
- $56 \times \log_2 15$
- $(5 \times \log_2 3) + (8 \times \log_2 5)$
- $15 \times \log_2 56$

✓ **Correcto**

We first apply the Product Rule to convert to the sum: $\log_2(3^8) + \log_2(5^7)$. Then apply the power and root rule.

10. If $\log_{10} y = 100$, what is $\log_2 y = ?$

1 / 1 puntos

- (selected) 332.19
- 500
- 301.03
- 20

✓ **Correcto**

Use the change of base formula, $\log_a b = \dfrac{\log_x b}{\log_x a}$

Where the "old" base is x and the "new" base is a.

So $\dfrac{100}{\log_{10}(2)} = \dfrac{100}{0.30103} = 332.19$

11. A tree is growing taller at a continuous rate. In the past 12 years it has grown from 3 meters to 15 meters. What is its rate of growth per year?

1 / 1 puntos

- ○ 12.41%
- ◉ 13.41%
- ○ 11.41%
- ○ 10.41%

✓ **Correcto**

$$\frac{\ln\frac{15}{3}}{12} = 0.1341$$

12. Bacteria can reproduce exponentially if not constrained. Assume a colony grows at a continually compounded rate of 400% per day. How many days before a colony with initial mass of 6.25 X 10^{-10} grams weights 1000 Kilograms?

1 / 1 puntos

- ○ 875 days
- ◉ 8.75 days
- ○ 0.875 days
- ○ 87.5 days

✓ **Correcto**

$$6.25 \times 10^{-10} \times e^{4t} = 10^{6}$$

$$4t = \ln\left(\frac{10^{6}}{(6.25 \times 10^{-10})}\right) = 35.00878$$

$$t = \ln\frac{10^{6}}{6.25 \times 10^{-10}} = 8.752195$$

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Graded quiz on Tangent Lines to Functions, Exponents and Logarithms

CALIFICACIÓN DEL ÚLTIMO ENVÍO
100%

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1. Convert $\frac{1}{49}$ to exponential form, using 7 as the factor.

1 / 1 puntos

- ○ (7^2)
- ○ $\frac{7}{7^3}$
- ○ 49^{-1}
- ◉ 7^{-2}

✓ **Correcto**
The rule for a factor to a Negative exponent is to divide by the same factor to a positive exponent with the same absolute value.

2. A light-year (the distance light travels in a vacuum in one year) is $9,460$ trillion meters. Express in scientific notation.

1 / 1 puntos

- ○ 9460×10^{12} meters
- ○ 0.946×10^{16}
- ○ 9.46×10^{15} kilometers
- ◉ 9.46×10^{15} meters.

✓ **Correcto**
$9,460$ is (9.4×10^3) meters and one trillion meters is 10^{12} meters. $(9.4 \times 10^3)(10^{12})$ = 9.4×10^{15}. A kilometer is 1000 meters.

3. Simplify $(x^8)(y^3)(x^{-10})(y^{-2})$

1 / 1 puntos

- ○ $(x)(y^{-2})$
- ○ $(x^2)(y)$
- ◉ $(x^{-2})(y)$
- ○ $(x^{-80})(y^{-6})$

✓ **Correcto**
By the Division and Negative Powers Rule, this is $(x^{(8-10)})(y^{(3-2)})$

4. Simplify $[(x^4)(y^{-6})]^{-1}$

1 / 1 puntos

- ○ $(x^3)(y^{-7})$
- ○ $\dfrac{(x^4)}{(y^{-6})}$
- ◉ $(x^{-4})(y^6)$
- ○ $\dfrac{(x^-4)}{(y^6)}$

✓ **Correcto**

By the Power to a Power Rule, each of the exponents is multiplied by (-1)

5. Solve for x:

1 / 1 puntos

$\log_2{(39x)} - \log_2{(x-5)} = 4$

- ○ $\dfrac{80}{38}$
- ○ $\dfrac{39}{23}$
- ◉ $\dfrac{-80}{23}$
- ○ $\dfrac{23}{80}$

✓ **Correcto**

$\log_2 \dfrac{39x}{(x-5)} = 4$ by the Quotient Rule.

Since both sides are equal, we can use them as exponents in an equation.

$$2^{\log_2 \frac{39x}{(x-5)}} = 2^4$$

$$\frac{39x}{(x-5)} = 16$$

$$39x = 16 \times (x-5)$$

$$39x = 16x - 80$$

$$23x = -80$$

$$x = \frac{-80}{23}$$

6. Simplify this expression:

1 / 1 puntos

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

- [ ] $x^{\frac{1}{3}}$
- [ ] x^{-1}
- [x] $x^{\frac{-3}{4}}$
- [ ] $x^{\frac{4}{3}}$

Correcto

We use the Power to a Power Rule -- multiply exponents:

$$x^{\frac{1}{2} \times \frac{-3}{2}} = x^{\frac{-3}{4}}$$

7. Simplify $\log_2 8 - \log_2 4 - (\log_3 4.5 + \log_3 2)$

1 / 1 puntos

- [ ] 0
- [x] -1
- [ ] 1
- [ ] 2

Correcto

This is equivalent to:

$$\log_2(\frac{8}{4}) - \log_3(4.5 \times 2) = 1 - 2 = -1$$

8. If $\log_3 19 = 2.680$, what is $\log_9 19$?

1 / 1 puntos

- ○ 0.4347
- ◉ 1.304
- ○ 0.8934
- ○ 5.216

✓ Correcto

To convert from $\log_3$ to $\log_9$, divide by $\log_3 9$. Which is equal to 2, so the answer is 1.34

9. If $\log_{10} b = 1.8$ and $log_a b = 2.5752$, what is a?

1 / 1 puntos

- ○ 6
- ◉ 5
- ○ 3
- ○ 4

✓ Correcto

To solve for a in the formula;

$$\log_a b = \frac{\log_x b}{\log_x a}$$

$\log_a b = 2.5752$ and $\log_{10} b = 1.8$

Therefore, $\log_{10} a$ must equal to $\dfrac{1.8}{2.5752} = 0.69897$

Treating both sides of equation $\log_{10} a = 0.69897$ as exponents of 10 gives $a = 10^{0.69897} = 5$

10. An investment of $1,600$ is worth $7,400$ after 8.5 years. What is the continuously compounded rate of return of this investment?

1 / 1 puntos

- ○ 17.01%
- ○ 19.01%
- ◉ 18.02%
- ○ 20.01

✓ Correcto

$$\frac{\ln \frac{7400}{1600}}{8.5} = 0.18017$$

11. A pearl grows in an oyster at a continuously compounded rate of $.24$ per year. If a 25-year old pearl weighs 1 gram, what did it weigh when it began to form?

1 / 1 puntos

- ○ 0.0002478
- ◉ 0.002478
- ○ 0.2478
- ○ 0.02478

✓ Correcto

$$e^{(0.24\times 25)} = \frac{1}{x}$$

$$x = \frac{1}{(e^{0.24\times 25})}$$

$$x = \frac{1}{403.4288}$$

$$x = 0.002478$$

12. $\log_2 z = 6.754$. What is $\log_{10}(z)$? 1 / 1 puntos

- ○ 0.82956
- ○ 0.49185
- ○ 1.3508
- ◉ 2.03316

✓ Correcto

$$\frac{\log_2 z}{\log_2 10} =$$

$$(\log_{10} z) \times (\log_2 10) = 3.321928$$

Therefore, $\log_{10} z = \dfrac{6.754}{3.321928} = 2.03316$

13. Suppose that $g : \mathbb{R} \to \mathbb{R}$ is a function, and that $g(1) = 10$. Suppose that $g'(a)$ is negative for every single value of a.Which of the following could possibly be $g(1.5)$? 1 / 1 puntos

- ○ $g(1.5) = 103.4$
- ◉ $g(1.5) = 9.7$
- ○ $g(1.5) = 10.1$
- ○ $g(1.5) = 11$

✓ Correcto

Since the slope of the tangent line to the graph of g is negative everywhere on the graph, we know that g is *decreasing* function! And therefore we must have $g(1.5) < g(1)$. That is the case here, so this value is at least possible.