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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 punto]
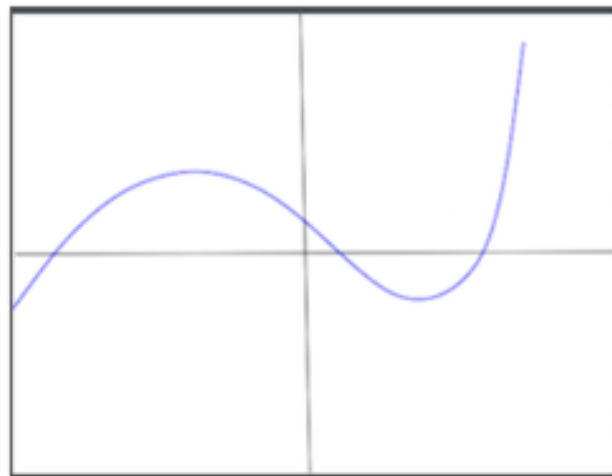
   ⦿ $f'(2) = \lim_{h \to 0} \frac{f(2+h) - f(2)}{h}$

   ◯ $f'(2) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$

   ◯ $f'(2) = mx + b$

   ◯ $f'(2) = 2$

   ✓ **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 punto]

   ◯ 3

   ◯ Never

   ◯ Always

   ⦿ 2

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

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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 punto

○ $(2 \times 7)^6$

○ $(2^6)(7^6)$

○ $(16^4)(49^2)$

◉ $(2^4)(7^2)$

> ✓ **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 punto

○ (x^2)

○ $(x^2) - 5$

◉ 1

○ -4

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

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

1 / 1 punto

◉ $(x - 5)^{-6}$

○ $(x - 5)$

○ $(x - 5)^{-1}$

○ $(x - 5)^{-5}$

4.

Simplify $\left(\dfrac{8^2}{8^7}\right)^2$

1 / 1 punto

○ 8^{-1}

○ 8^{-5}

○ 8^{-4}

◉ 8^{-10}

✓ **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. $\dfrac{8^4}{8^{14}} = 8^{-10}$

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

1 / 1 punto

Solve for x

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

1 / 1 punto

Solve for x

○ 4

◉ 5

○ 28

○ 7

✓ **Correcto**

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

$\log(x) = \log\left(\dfrac{35}{7}\right)$

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

---

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

0 / 1 punto

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

0 / 1 punto

Solve for x

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

✗ **Incorrecto**

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

Use both sides as exponent for 2.

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

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

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

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

1 / 1 punto

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

✓ **Correcto**

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

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

1 / 1 punto

- ○ 8
- ○ 15
- ⦿ $\log_3 15$

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

1 / 1 punto

○ $(5 \times \log_2 3) + (8 \times \log_2 5)$

◉ $(8 \times \log_2 3) + (7 \times \log_2 5)$

○ $56 \times \log_2 15$

○ $15 \times \log_2 56$

✓ **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 punto

◉ 332.19

○ 301.03

○ 20

○ 500

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 punto

◉ 13.41%

○ 11.41%

○ 10.41%

○ 12.41%

✓ **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 6.25×10^{-10} grams weights 1000 Kilograms?

1 / 1 punto

○ 875 days

◉ 8.75 days

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Graded quiz on Tangent Lines to Functions, Exponents and Logarithms

CALIFICACIÓN DEL ÚLTIMO ENVÍO

100%

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

1 / 1 punto

- ⦿ 7^{-2}
- ◯ (7^2)
- ◯ 49^{-1}
- ◯ $\dfrac{7}{7^3}$

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 6.25×10^{-10} grams weights 1000 Kilograms?

1 / 1 punto

- ◯ 875 days
- ⦿ 8.75 days
- ◯ 0.875 days
- ◯ 87.5 days

✓ **Correcto**

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

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

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

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

1 / 1 punto

○ $(x^3)(y^{-7})$

◉ $(x^{-4})(y^6)$

○ $\dfrac{(x^4)}{(y^{-6})}$

○ $\dfrac{(x-4)}{(y^6)}$

✓ **Correcto**

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

5. Solve for x:

1 / 1 punto

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

○ $\dfrac{80}{38}$

○ 23

---

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 punto

○ 0.946×10^{16}

○ 9460×10^{12} meters

◉ 9.46×10^{15} meters.

○ 9.46×10^{15} kilometers

✓ **Correcto**

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

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

1 / 1 punto

○ $(x^2)(y)$

○ $(x)(y^{-2})$

○ $(x^{-80})(y^{-6})$

◉ $(x^{-2})(y)$

5. Solve for x:

1 / 1 punto

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

○ $\dfrac{80}{38}$

○ $\dfrac{23}{80}$

◉ $\dfrac{-80}{23}$

○ $\dfrac{39}{23}$

✓ **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.

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

$39x$

6. Simplify this expression:

1 / 1 punto

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

◉ $x^{\frac{-3}{4}}$

○ $x^{\frac{1}{3}}$

○ x^{-1}

○ $x^{\frac{4}{3}}$

✓ **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 punto

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

○ 1

○ 0

◉ −1

○ 2

✓ **Correcto**

This is equivalent to:

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

1 / 1 punto

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

○ 0.8934

○ 5.216

1 / 1 punto

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

○ 0.8934

○ 5.216

◉ 1.304

○ 0.4347

1 / 1 punto

✓ **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?

○ 6

◉ 5

○ 3

1 / 1 punto

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

`1 / 1 punto`

○ 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 $\dfrac{1.8}{2.5752} = 0.69897$

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 punto`

○ 17.01%

○ 19.01%

○ 20.01

◉ 18.02%

✓ **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 punto`

◉ 0.002478

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 punto`

- ⦿ 0.002478
- ○ 0.0002478
- ○ 0.02478
- ○ 0.2478

✓ **Correcto**

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

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

---

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

`1 / 1 punto`

- ○ 0.49185
- ○ 1.3508
- ○ 0.82956
- ⦿ 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

`1 / 1 punto`

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

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 punto**

    ○ $g(1.5) = 10.1$

    ○ $g(1.5) = 103.4$

    ◉ $g(1.5) = 9.7$

    ○ $g(1.5) = 11$

    ✓ **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.