

Test 3 Review

Monday, November 25, 2019 11:05 AM

MC

① $f(x) = \frac{5x-1}{3}$. Find the inverse.

Step 1: Replace $f(x)$ by y

$$y = \frac{5x-1}{3}$$

Step 2: Interchange "x" and "y"

$$x = \frac{5y-1}{3}$$

Step 3: Solve for y itself

$$3x = 5y - 1 \quad (\text{Multiply both sides by 3})$$

$$3x + 1 = 5y \quad (\text{Add 1 to both sides})$$

$$\frac{3x+1}{5} = y \quad (\text{Divide both sides by 5})$$

$$y = \frac{3x+1}{5}$$

Step 4: Replace y by $f^{-1}(x)$

$$f^{-1}(x) = \frac{3x+1}{5}$$

D.

② Horizontal line test.

This has an inverse. B.

③ Calculation. B.

④ $\log_{\boxed{6}} \boxed{216} = \boxed{x}$ $\longrightarrow$ $\boxed{6^x = 216}$ B.

(Logarithmic form)

(Exponential Form)

⑤ $\boxed{5}^{\boxed{-2}} = \boxed{\frac{1}{25}}$ $\longrightarrow$ $\boxed{\log_5 \frac{1}{25} = -2}$ D

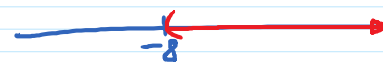
(Inverse Form)

$$\textcircled{5} \quad \boxed{5}^{\boxed{-2}} = \frac{1}{25} \quad \longrightarrow \quad \boxed{\log_5 25} \quad \text{(Logarithmic Form)}$$

(Exponential Form)

$$\textcircled{6} \quad \log_9 81 = 2 \quad \text{C}$$

$$\textcircled{7} \quad f(x) = \log_9 (\boxed{x+8})$$

Set $x+8 > 0 \longrightarrow x > -8$ 

In interval notation: $(-8, \infty)$ D.

$$\textcircled{8} \quad \log \left(\frac{x}{100} \right) = \log x - \log 100$$

$$= \boxed{\log x - 2} \quad \text{B}$$

$$\textcircled{9} \quad \frac{1}{2} \log_9 x + \log_9 y = \log_9 x^{\frac{1}{2}} + \log_9 y$$

↓
Power Rule

$$= \log_9 \sqrt{x} + \log_9 y$$

$$= \log_9 (\sqrt{x} \cdot y) = \log_9 (y \cdot \sqrt{x}) \quad \text{C}$$

$$\textcircled{10} \quad \frac{2x}{e} = 6$$

Step 1: Take $\ln$ of both sides:

$$\ln \left(\frac{2x}{e} \right) = \ln 6$$

Step 2: Power Rule.

$$2x \underbrace{\ln(e)}_1 = \ln 6$$

$$2x = \ln 6$$

$$\boxed{x = \frac{\ln 6}{2}}$$

$$x = \frac{\ln 6}{2} \quad C$$

$$(11) \log_2 13^{-5} = -5 \log_2 13 \quad B.$$

Power Rule

(12) Given: $\log_a 2 = 0.3010$
 $\log_a 3 = 0.4771$.

Find: $\log_a \frac{9}{8}$

$$\log_a \frac{9}{8} = \log_a 9 - \log_a 8 = \log_a 3^2 - \log_a 2^3$$

quotient

$$= 2 \log_a 3 - 3 \log_a 2 = 2(0.4771) - 3(0.3010)$$

$$= 0.0512 \quad A.$$

$$(14) \log_b (y \cdot z^9) = \log_b y + \log_b z^9 = \log_b y + 9 \log_b z$$

product rule power rule

$$(15) 2 \log_y 3 + \log_y 2 = \log_y 3^2 + \log_y 2 = \log_y 9 + \log_y 2$$

$$= \log_y (9 \cdot 2) = \log_y (18)$$

power rule product rule

$$(16) 3^{3x-6} = 27$$

3^{3x-6} 3

$$3^{\boxed{3x-6}} = 3^{\boxed{3}}$$

$$3x - 6 = 3$$

$$3x = 9$$

$$\boxed{x = 3}$$

$$\textcircled{17} \quad \log_5 \boxed{x} + \log_5 \boxed{(x-24)} = 2$$

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↓ Product rule

$$\log_{\boxed{5}} \boxed{x \cdot (x-24)} = \boxed{2}^{\text{exp.}}$$

↓
base

$$x \cdot (x-24) = 5^2$$

$$x \cdot (x-24) = 25$$

$$x^2 - 24x = 25$$

$$x^2 - 24x - 25 = 0$$

$$(x-25)(x+1) = 0$$

$$x = 25 \quad ; \quad x = -1$$

Check answer: $\log_5 x + \log_5 (x-24) = 2.$

check $\boxed{x=25}$: $\boxed{\log_5 25} + \boxed{\log_5 1} = 2$,

Check $x = 25$: $\log_5 25 + \log_5 1 = 2$
 Solution: $2 + 0 = 2 \checkmark$

~~Check $x = -1$: $\log_5 (-1) + \log_5 (-25) = 2$.~~

Conclusion: Solution is: $\{25\}$.

18 $e^{x+8} = 3$.

Take $\ln$ of both sides:

$\ln e^{x+8} = \ln 3$

Power rule $\nearrow 1$

$(x+8) \ln e = \ln 3$

$x+8 = \ln 3$

$\longrightarrow x = \ln 3 - 8$