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

$3x = 5y - 1$ (Multiply both sides by 3)

$3x + 1 = 5y$ (Add 1 to both sides)

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

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

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

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

(2) Horizontal line test.

This has an inverse. B.

(3) Calculator. B.

(4) $\log_{\boxed{6}} \boxed{216} = \boxed{x}$ (number, base, exponent)

(Logarithmic form) $\longrightarrow$ $\boxed{6^x = 216}$ B.

(Exponential Form)

(5) $\boxed{5}^{\boxed{-2}} = \boxed{\frac{1}{25}}$ (base, exponent, number)

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

(Logarithmic Form)

(5) $5^{-2} = \frac{1}{25}$ → $\log_5 \frac{1}{25}$ D

base

(Exponential Form) (Logarithmic Form)

(6) $\log_9 81 = 2$. C

(7) $f(x) = \log_9 (x+8)$

Set $x+8 > 0$ → $x > -8$ → $(-8, \infty)$

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

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

$= \log x - 2$ B.

(9) $\frac{1}{2}\log_9 x + \log_9 y = \log_9 x^{\frac{1}{2}} + \log_9 y$

Power Rule

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

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

(10) $e^{2x} = 6$

Step 1: Take ln of both sides:

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

Step 2: Power Rule.

$2x \underbrace{\ln(e)}_{1} = \ln 6$

$2x = \ln 6$.

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

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

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

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

product

$= 0.0512$ 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) $2 \log_y 3 + \log_y 2 = \log_y 3^2 + \log_y 2 = \log_y 9 + \log_y 2$

power rule

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

product rule

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

$3x-6$ 3

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

$3x - 6 = 3$

$3x = 9$

$\boxed{x = 3}$.

---

(17) $\log_5 x + \log_5 (x-24) = 2$

product rule

$\log_5 [x \cdot (x-24)] = 2$ (exp.)

base: 5

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

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

$x^2 - 24x = 25$

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

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

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

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

Check $x = 25$: $\log_5 25 + \log_5 1 = 2$,

Check $x = 25$: $\log_5 25 + \log_5 1 = 2$

Solution. $2 + 0 \stackrel{?}{=} 2$ ✓.

~~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 ↗ 1

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

$x + 8 = \ln 3 \longrightarrow x = \ln 3 - 8$