MAC1140 SEC29 HW 10-01-2007 4.4 4.5

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Full Name: Fei Hua Sec#: Extra Credit Attempted?

1.
[4.4.1dMSPT]Select ALL of the correct formulas/statements if $x > 0, y > 0, x \neq 1, y \neq 1$

- ☐ $\frac{\log x}{\log y} = \log \frac{x}{y}$ ← typical mistake.
- ☐ $\log_{\frac{1}{3}} \frac{1}{3} = 3$ $(\frac{1}{3})^3 \neq 3$.
- ■ $\log xy = \log x + \log y$ basic property.
- ☐ $\log_3 \frac{1}{3} = -3$ $(3)^{-3} \neq \frac{1}{3}$
- ☐ $\log_{-2}(-2) = 1$ ← undefined
- ■ $\log_3 5 = \frac{\log 5}{\log 3}$ ← change of base formula.

2.[4.5.1aPT]Find x if $\log_5 25^x = -1$.

- ● $-\frac{1}{2}$
- ○ $\frac{1}{2}$
- ○ $-\frac{1}{5}$
- ○ -2

log eqn.

by defn $5^{-1} = 25^x$

$5^{-1} = (5^2)^x$

$5^{-1} = 5^{2x}$

equate exponent:

$-1 = 2x$

$x = \frac{-1}{2}$

3. [4.5.1bPT]Find x if $\log_x \frac{1}{9} = -2$.

- ○ $-\frac{2}{9}$
- ● 3
- ○ $-3, 3$
- ○ $\frac{1}{3}$

by defn $x^{-2} = \frac{1}{9}$

$(x^2)^{-1} = \frac{1}{9}$

$\frac{1}{x^2} = \frac{1}{9}$

$x^2 = 9$

$x = \pm\sqrt{9} = \pm 3$.

but $\log_{-3} \frac{1}{9}$ is undefined

$x = 3$.

4.

[4.5.1cPT]Select the choice with all x such that $\log_{12}(1-x)+\log_{12}(2-x)=1$.

by properties of log.

- ○ 5, −2
- ○ No solution
- ○ −1
- ● −2
- ○ 5

DO NOT drop $\log_{12}$ → $\log_{12}(1-x)(2-x)=1$.

by defn.

quadratic func. → $(1-x)(2-x)=12$

$x^2-3x+2=12$.

$x^2-3x-10=0$

$(x+2)(x-5)=0$.

$x=-2$ or $x=5$.

but if $x=5$.

$\log_{12}(1-x)=\log_{12}(-4)$

↑ undefined, only $x=-2$ will make proper sense.

5.

[4.5.1fPT]Select the choice containing all x such that $-3\log_5 x=\log_5\frac{1}{8}$.

$\log_5 x^{-3}=\log_5\frac{1}{8}$

- ○ $\frac{1}{2}$
- ○ $\frac{8}{3}$
- ○ None of these
- ● 2
- ○ $\frac{3}{8}$

$x^{-\frac{6}{3}}=\frac{1}{8}$

$(x^{\frac{2}{3}})^{-1}=\frac{1}{8}$

$\frac{1}{x^{\frac{2}{3}}}=\frac{1}{8}$

$x^3=8$ $x=2$.

6. [4.5.2aPT]Find x such that $4^{(x-1)}=2^{-2x}$.

Unify base of exponentials

- ● $\frac{1}{2}$
- ○ $\frac{1}{6}$
- ○ $\frac{2}{3}$
- ○ $\frac{1}{4}$

$(2^2)^{x-1}=2^{-2x}$

Not $2x-1$ → $2^{2\cdot(x-1)}=2^{-2x}$

$2(x-1)=-2x$

$2x-2=-2x$

$4x=2$

$x=\frac{1}{2}$

7. [4.5.2bPT]Find all x such that $e^{1-2x}=\frac{1}{e^2}$.

- ○ None of these
- ○ $-\frac{1}{2}$
- ○ $\frac{1}{4}$
- ○ $\frac{2}{3}$
- ● $\frac{3}{2}$

$e^{1-2x}=e^{-2}$

$1-2x=-2$.

$2x=3$

$x=\frac{3}{2}$.

8. [4.5.3aPT]Find all x such that $5^{(2x)} = 2$.

No common base, unknown in the exponent.

- ○ $\frac{\ln 2}{\ln 10}$
- ○ $\ln \frac{1}{5}$
- ● $\frac{\ln 2}{\ln 25}$
- ○ None of these
- ○ $\ln \frac{2}{25}$

$\ln 5^{2x} = \ln 2$.

$2x \cdot \ln 5 = \ln 2$.

$x = \frac{\ln 2}{2 \cdot \ln 5} = \frac{\ln 2}{\ln 5^2} = \frac{\ln 2}{\ln 25} \neq \ln \frac{2}{25}$

not a choice

typical mistake.

9. [4.5.3bPT]Find all x such that $e^{(4-3x)} = 3$.

No common base, unknown in the exponent.

must have a log here. can't take log of just one side.

- ● None of these
- ○ $\frac{\ln 3}{3} - 4$
- ○ $\frac{1}{3}$
- ○ $\frac{4+\ln 3}{3}$
- ○ $\frac{\ln 3 - 4}{3}$

$\ln e^{4-3x} = \ln 3$.

don't forget ( )

$(4-3x)\ln e = \ln 3$

$3x = 4 - \ln 3$

$x = \frac{4 - \ln 3}{3}$.