PreCal Practice Test on KC 3 DATE:____________________

Non Calculator

1) *Evaluate*: $-7\log 10^3 - 3$

① $-7\log 10^3 - 3$

$-7(3)-3$

$-21-3$

$\boxed{-24}$

2) *Evaluate*: $\log_{17} 17^{9/14}$

② $\log_{17} 17^{9/14}$

$\boxed{9/14}$

3) *Solve for m*: $\log_{\frac{1}{5}} \sqrt[3]{25}^{\,5} = m$

③ $\log_{\frac{1}{5}} \sqrt[3]{25}^{\,5} = m$

$\left(\frac{1}{5}\right)^m = \sqrt[3]{25}^{\,5}$

$\left(\frac{1}{5}\right)^m = 25^{5/3}$

$(5^{-1})^m = (5^2)^{5/3}$

$5^{-m} = 5^{10/3}$

$-m = 10/3$

$\boxed{m = -10/3}$

4) *Solve for q*: $\frac{1}{16} = 2^{q-3}$

④ $\frac{1}{16} = 2^{q-3}$

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

$2^{-4} = 2^{q-3}$

$-4 = q-3$

$\boxed{-1 = q}$

5) *Condense the expression*: $2\left[5\log(x+2) + \log x\right] - \log(x+4)$

$10\log(x+2) + 2\log x - \log(x+4)$

$\log(x+2)^{10} + \log x^2 - \log(x+4)$

$\log((x+2)^{10}\cdot x^2) - \log(x+4)$

$\boxed{\log\left(\frac{(x+2)^{10}\cdot x^2}{x+4}\right)}$

6) Condense: $2\log_3 y + \log_3 z - \frac{1}{3}\log_3 x$

$\log_3 y^2 + \log_3 z - \log_3 x^{1/3}$

$\log_3(y^2 z) - \log_3 \sqrt[3]{x}$

$\boxed{\log_3\left(\frac{y^2 z}{\sqrt[3]{x}}\right)}$

7) *Solve for w*: $\log_5(2w-3) = 2$

$2w-3 = 5^2$

$2w-3 = 25$

$2w = 28$

$\boxed{w = 14}$

8) Solve: $\ln 15 - \ln x = \ln 3$

$\ln\left(\frac{15}{x}\right) = \ln 3$

$\frac{15}{x} = 3$

$15 = 3x$

$\boxed{5 = x}$

9) *Solve for a*: $-4 = \log_a \frac{1}{16}$

⑨ $-4 = \log_a \frac{1}{16}$

$a^{-4} = \frac{1}{16}$

$a^{-4} = \frac{1}{2^4}$

$a^{-4} = 2^{-4}$

$\boxed{a = 2}$

10) Solve: $\frac{e^x - 4e^{-x}}{3} = 1$

$e^x - 4e^{-x} = 3$

$(e^x)e^x - \left(\frac{4}{e^x}\right)e^x = (3)e^x$

$(e^x)^2 - 4 = 3e^x$

$(e^x)^2 - 3e^x - 4 = 0$

let $u = e^x$

$u^2 - 3u - 4 = 0$

$(u-4)(u+1) = 0$

$u = 4,\ u = -1$

$u = 4,\ u = -1$

$e^x = 4 \qquad e^x = -1$

$\ln e^x = \ln 4 \qquad \ln e^x = \ln(-1)$

$\boxed{x = \ln 4}$

can't $\ln$ "−" #s

11) Solve: $\log(x-6)^2 = 4$

$(x-6)^2 = 10^4$

$\sqrt{(x-6)^2} = \sqrt{10^4}$

$x-6 = \pm 10^2$

$x-6 = 100 \qquad x-6 = -100$

$\boxed{x = 106} \qquad \boxed{x = -94}$

both #s check ☺

12) *Find the Domain, Range, X&Y Intercepts, and Asymptotes of*:

$$f(x) = -1 + \log_5(x+3)$$

translate down 1 unit

translate left 3 units

Graph the function. Label all parts

$\boxed{\text{Domain}: (-3, \infty)}$

$\boxed{\text{Range}: (-\infty, \infty)}$

$\boxed{\text{Vertical Asymptote}: x = -3}$

y-int → when x = 0

$f(0) = -1 + \log_5(0+3)$

$= -1 + \log_5 3$

$\boxed{\text{y-int}: (0, -1+\log_5 3)}$

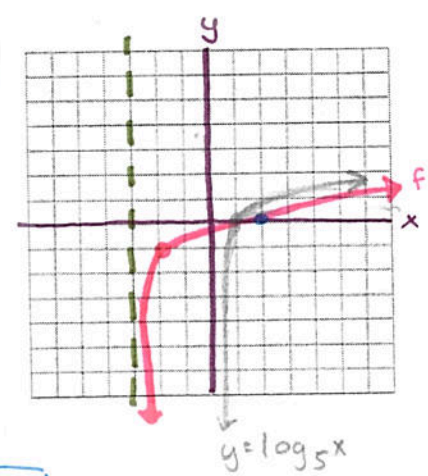
x-int → when y = 0

$0 = -1 + \log_5(x+3)$

$5^1 = 5^{\log_5(x+3)}$

$5 = x+3$

$\boxed{\text{x-int}: (2, 0)}$

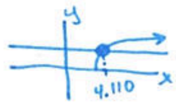


Calculator

13) *Solve for x*: $\ln(x+4)+\ln(x-3)=2\ln 3$

Graph + get intersection

$\boxed{x = 4.110}$



OR

$\ln(x+4)(x-3) = \ln 3^2$

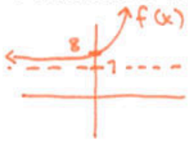
$(x+4)(x-3) = 9$

$x^2+4x-3x-12=9$

$x^2+x-21=0 \rightarrow$ graph + get zeroes

$\boxed{x = 4.120}$ $x=-5.110$ ← extraneous

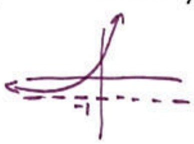
14) *Find the Domain & Range of*: $f(x)=e^x+7$



Domain: $(-\infty,\infty)$

Range: $(7,\infty)$

15) Identify the domain, range, x&y intercepts, and any asymptotes for $3^{x+2}-1$



Domain: $(-\infty,\infty)$ x-int: $(2,0)$ no H.A.

Range: $(-1,\infty)$ y-int: $(0,8)$ V.A @ $x=-1$

16) The # of bacteria in a petri dish after "t" hours is $B=100e^{kt}$ *where* $t=0$ represents the time 12pm. At 6am the # of bacteria was 42.

$\hookrightarrow t=-6$ B↑

a) Find "k"

b) Using "k", find the # of bacteria at 8pm. ↑ $t=8$

a) $B=100e^{kt}$

$42=100e^{k(-6)}$

$42=100e^{-6k}$

$\frac{42}{100}=e^{-6k}$

$\ln(\frac{42}{100})=\ln e^{-6k}$

$\ln(\frac{42}{100})=-6k$

$k=\frac{\ln(\frac{42}{100})}{-6}$

$\boxed{k=.145}$ ← Store in calculator

$B=100e^{.145t}$

$B=100e^{.145(8)}$

$B=317.932$

$\boxed{317 \text{ bacteria}}$

17) The population of Wellsville can be represented by $P=1500e^{kt}$, t=0 is 2010. In 1990, the population was 1400. Find k and use this to predict the population in 2020. ← $t=10$

↓ $t=-20$

$P=1500e^{kt}$

$1400=1500e^{k(-20)}$

$\frac{1400}{1500}=e^{-20k}$

$\ln(\frac{14}{15})=\ln e^{-20k}$

$\ln(\frac{14}{15})=-20k$

$k=\frac{\ln(\frac{14}{15})}{-20}$

$\boxed{k=.003}$ ← "sto" in calc.

$P=1500e^{.003t}$

$P=1500e^{.003(10)}$

$P=1552.648$

$\boxed{1552 \text{ people}}$

18) You invest \$1300 at Peter Venkman's savings and loan at 8% interest compounded continuously. How long will it take for the balance to double?

$\hookrightarrow A=Pe^{rt}$

$P=1300$

$r=.08$

$A=2600$ (double \$1300)

$2600=1300e^{.08t}$

$2=e^{.08t}$

$\ln 2=.08t$

$\frac{\ln 2}{.08}=t \rightarrow \boxed{t=8.664 \text{ years}}$