(1) If $\ln 2 = 0.7$ and $\ln 3 = 1.1$, then $\log_{36}\left(\frac{e^3}{12}\right) =$

(a) $\frac{e^3}{9}$ **(b)** $\frac{1}{3}$ **.(c)** $\frac{5}{36}$ * **(d)** $\frac{27}{36}$ **(e)** e^5

If $\log 0.04 = x$, then $\log 80 =$

(a) $\frac{3x}{2}+4$ * **(b)** $\frac{3x}{2}+2$ **(c)** $4y+3x$ **(d)** $\frac{3x}{2}-2$ **(e)** $3x$

(2) If $a>0, a\neq 1$ and $y=\frac{\log(\ln a)}{\log a}$, then $a^y =$

.(a) $\ln a$ * **(b)** $\frac{1}{\ln a}$ **(c)** a **(d)** e **(e)** $\log a$

(3) If $(\log_5 16)(\log_2 \sqrt{5}) - (\sqrt{e})^{-6\ln 2} =$

.(a) $\frac{15}{8}$ * **(b)** $\frac{18}{9}$ **(c)** $\frac{17}{8}$ **(d)** 14 **(e)** $\frac{19}{9}$

(4) Which one of the following statements is FALSE?

a) $\ln e^x = x$ for any real number x

b) $e^{\ln x} = x$ for any real number x *

c) $\ln\frac{1}{10} < \ln\frac{1}{3}$

d) $\log_{\frac{1}{3}} 4 > \log_{\frac{1}{3}} 5$

e) $g(x) = \left(\frac{1}{3}\right)^{-x}$ is an increasing function.

(5) Which one of the following statements is FALSE?

a) $\log_{\frac{1}{2}} 8 = -3$

b) $\log xy = \log x + \log y, x>0, y>0, a>0,$ and $a\neq 1$

c) $a^{\log_a x} = x, x>0, a>0,$ and $a\neq 1$

d) $\frac{\log_a x}{\log_a y} = \log_a(x-y)$ *

e) If $y=\ln(x-3)+1$, then $x = 3+e^{y-1}$

(6) The graph of $y=\log_3(2x+1)-2$ has

(a) x-int. $x=2$ **; y-int.** $y=-1$ **(b) 4;-1**

(c)3;-2 * (d) 4;-2 (e) 3;1

(7) Suppose the number of rabbits in a colony is $y = y_0 3^{\frac{t}{7}}$, where t is the time in months and y_0 is the rabbit population at t_0. Then rabbits are **doubled** when $t =$

(a) $\frac{\ln 2}{7}$ **(b)** $7\log_2 3$ **(c)** $\frac{\ln 3}{7}$

(d) $7\log_3 2$ **(e)** $7\ln 2$

(8) Suppose the number of mice in a colony is $y = y_0 10^{\frac{t}{2}}$, where t is the time in months and y_0 is the rabbit population at t_0. If the number of mice at $t=2$ is 10^6, then the number of mice at $t=6$ is:

(a) 10^8 * **(b)** 10^5 **(c)** 10^6
(d) 10^{15} **(e)** 10^7

(9) The adjacent figure represents the graph of

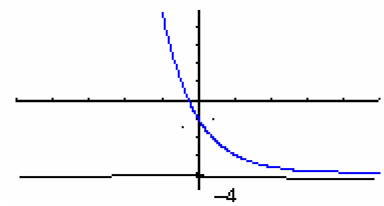
$a)\ y=\log_{\frac{1}{4}}(x-1)$

$b)\ y=\log_{\frac{1}{4}}(x+1)$

$c)\ y=2^{-x+1}-6$

$d)\ y=3^{-x+1}-4$ *

$e)\ y=-3^{-x+1}+2$



(10) The adjacent figure represents the graph of

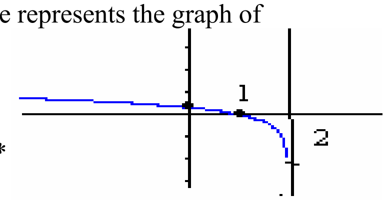
$a)\ y=\log_4(x-2)$

$b)\ y=\log_4(2-x)$ *

$c)\ y=\log_4|2-x|$

$d)\ y=\log_{\frac{1}{4}}(x-2)$

$e)\ y=\left|\log_{\frac{1}{4}}(x-2)\right|$



(11) The adjacent figure represents the graph of

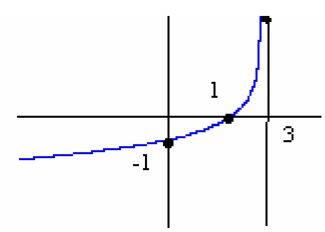
$a)\ y=\log_3(x+2)$

$b)\ y=\log_{\frac{1}{3}}(2-x)$

$c)\ y=\log_3(3-x)$

$d)\ y=\log_{\frac{1}{3}}(3-x)$ *

$e)\ y=\log_{\frac{1}{3}}(3+x)$



(12) The adjacent figure represents the graph of

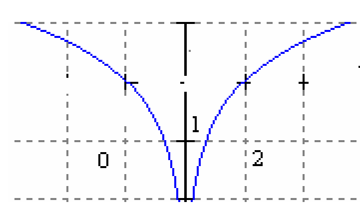
$a)\ y=1+\log_2|x-1|$ *

$b)\ y=1+\log_2|x-2|$

$c)\ y=1+\log_2\left|x-\frac{3}{2}\right|$

$d)\ y=\log_2|x-1|$

$e)\ y=-1+1+\log_2|x-1|$



(13) If $(343)^{3-x} = (49)^x$, then $x =$

(a) $\frac{5}{9}$ **(b)** $\frac{9}{5}$ * **(c)** 9 **(d)** 2 **(e)** $\frac{1}{2}$

(14) The solution set of the equation $2^{2x+1} - 7\cdot 2^x - 4 = 0$ is:

(a) {2}* **(b) {-1}** **(c){-2,2}** **(d){0}** **(e) {1}**

(15) The solution set of the equation $2\log\sqrt{x+3} + \log(2-x) = \log(-2x)$ consists of

a) Two positive real numbers
b) Two negative real n umbers
c) One positive and one negative real numbers
d) One positive real number only
e) One negative real number only *

(16) The solution set of the eq. $\ln x = -(\ln x)^2$ consists of

a) One rational and one irrational numbers
b) Two irrational numbers
c) Two rational numbers
d) One rational only
e) One irrational only *

(17) The graphs of the exponential functions $f(x) = e^{x^2}$ and $g(x) = (e^x)^2$ intersects at:

a) $x = 0, -2$ **b)** $x = 0$ **c)** $x = 0, 1$ **d)** $x = 0, 2$ *

(18) The solution set of the equation $\log_2\sqrt{x-2} + \log_4(x-4) = \frac{1}{2}(3 + \log_2 3)$ is

a) $\{3,8\}$ **b)** $\{-2,8\}$ **c)** $[8]$ * **d)** the empty set **e)** $\{\sqrt{24}, 8\}$

(19) The solution set of $\log_2 x < -1$ is

a) $(0,1)$ **b)** $(0,\frac{1}{2})$ * **c)** $(1,\infty)$ **d)** the empty set **e)** $(1,\frac{1}{2})$

(20) The solution set of $\log_{\frac{1}{3}} x < -1$ is

a) $\left(1,\frac{1}{3}\right)$ **b)** $(0,\frac{1}{2})$ **c)** $(3,\infty)$ * **d)** the empty set **e)** $(1,3)$

(21) The length of the arc of a circle of a diameter 12 cm the subtends an angle 40^o is

a) $\frac{2\pi}{3}$ **b)** $\frac{8\pi}{3}$ * **c)** $\frac{4\pi}{3}$ **d)** 240 **e)** $\frac{27}{\pi}$

(22) $(\sin 510^o)(\csc 330^o) + \cos(-330^o)\sec(210^o) =$

a) 0 **b)** -1 **c)** -2 * **d)** 1 **e)** 2

(23) If the point $(-3,4)$ lies on the terminal side of an angle θ in standard position, then $\sin(-\theta) + \sec\theta =$

a) $-\frac{37}{15}$ * **b)** $\frac{37}{15}$ **c)** $\frac{-13}{15}$ **d)** $\frac{13}{15}$ **e)** $\frac{-37}{20}$

(24) $\tan 945^o - \sin\left(-\frac{79\pi}{6}\right) =$

a) $\frac{3}{2}$ **b)** $\frac{1}{2}$ * **c)** $\frac{\sqrt{3}}{2}$ **d)** $-\frac{\sqrt{3}}{2}$ **e)** 2

(25) If $\sec\theta = -\frac{3}{2}$ and $\tan\theta = \frac{\sqrt{5}}{2}$, then $\csc\theta =$

a) $\frac{3\sqrt{5}}{5}$ **b)** $-\frac{3\sqrt{5}}{5}$ * **c)** $-\frac{2}{3}$ **d)** $-\frac{\sqrt{5}}{3}$ **e)** $\frac{\sqrt{5}}{2}$

(26) Which one of the following is not possible?

a) $\tan x = 10$ **b)** $\cot x = -3$ **c)** $\sin x = \frac{\pi}{4}$ **d)** cosx=$\frac{\sqrt{2}}{100}$ **e)** csc $= \frac{1}{2}$ *

(27) If for an arc t on the unit circle $W(t) = \left(\frac{\sqrt{3}}{6}, y\right), y < 0$, then $W(\pi - s) =$

a) $\left(\frac{\sqrt{3}}{6}, -\frac{\sqrt{33}}{6}\right)$ * b) $\left(\frac{\sqrt{3}}{6}, \frac{\sqrt{33}}{6}\right)$ c) $\left(-\frac{\sqrt{3}}{6}, -\frac{\sqrt{33}}{6}\right)$ d) $\left(y, -\frac{\sqrt{3}}{6}\right)$ e) $\left(x, \frac{\sqrt{33}}{6}\right)$

(28) If the line segment from the origin to the pint $(-7,24)$ intersects the unit circle at

a) $\left(-\frac{7}{25}, \frac{24}{25}\right)$ * b) $\left(-\frac{7}{25}, \frac{-24}{25}\right)$ c) $\left(\frac{7}{25}, \frac{-24}{25}\right)$ d) $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$ e) $\left(-\frac{\sqrt{3}}{2}, \frac{-1}{2}\right)$

(29) The function $y = 2 + \sin\left(x - \frac{\pi}{3}\right)$ is:

a) Increasing on $[0,\pi]$ b)increasing on $[\frac{\pi}{4}, \frac{\pi}{2}]$

c) decreasing on $[0,\pi]$ d) decreasing on $[\frac{\pi}{3}, \frac{5\pi}{6}]$

(30) The range of $y = -\frac{5}{4} + \frac{3}{2}\csc(2x - \frac{\pi}{6})$ is

a) $\left(-\infty, \frac{-11}{4}\right] \cup \left[\frac{1}{4}, \infty\right)$* b) $\left(-\infty, \frac{-1}{4}\right] \cup \left[\frac{11}{4}, \infty\right)$

c) $\left(-\infty, \frac{-3}{2}\right] \cup \left[\frac{1}{4}, \infty\right)$ d) $(-\infty, -1] \cup [1, \infty)$

(31) The number of zeros of the function $y = \sec\frac{\pi}{2}x - x$ on the interval $[0, \pi]$ is

a) 1* b) 2 c) 3 d) 4 e) 0