1) If $f(x) = \sqrt[3]{\frac{1}{3}(x - 8)}$, then $(f^{-1} \circ f)(20) + f^{-1}(-1)$ is equal to :

A) 25

B) 20

C) 19

D) 18

E) 21

2) If $f(x) = (x - 3)^2 + 1$, $x \leq 3$, then the graph of $f^{-1}(x)$ lies above the x-axis on the interval:

A) [1, 10)

B) (2, 4)

C) (-2, 6)

D) [-1, 6)

E) [-3, 12)

3) If $f(x) = ax + b$, $g(x) = 3x + 2$, and $g(x) = 2f^{-1}(x)$, then $a \cdot b$ is equal to :

A) $-\frac{4}{9}$

B) $\frac{4}{9}$

C) 3

D) 1

E) - 3

4) The graph of the function of $f(x) = 4 - 2^{3-x}$ lies below the line $y = 3$ on the interval :

A) $(-\infty, 3)$

B) $(3, \infty)$

C) $(-\infty, 2)$

D) $(10, \infty)$

E) $(-\infty, \infty)$

5) If the graph of $f(x) = -a^{x+b} + c$, is given below, then $2a + b + c =$

A) - 1

B) - 5

C) 4

D) - 2

E) 7

6) The range of the function $f(x) = 2 - e^{-|x|}$ is :

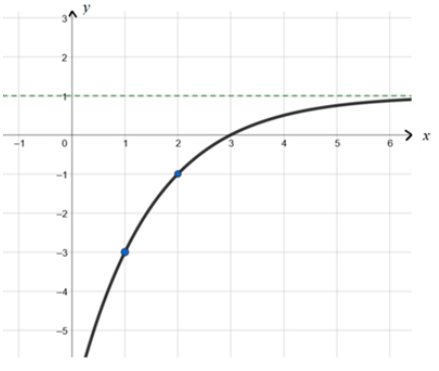
A) [1, 2)

B) [1, 3)

C) $(e, 3)$

D) [2, 3)

E) $[1, e)$



7) If $(a, 0)$ is the x - intercept and $(0, b)$ is the y - intercept of the function $f(x) = \log_3 \left(\frac{x-1}{x-9}\right) - 1$, then $a + b =$

A) 10

B) 9

C) 8

D) 7

E) 6

8) The domain of the function $f(x) = \ln \left(\frac{x-3}{x}\right) - 2$, in interval notation, is :

A) $(-\infty, 0) \cup (3, \infty)$

B) $(-\infty, 0) \cup (0, 3)$

C) $(3, \infty)$

D) $(-\infty, 0)$

E) $(0, 3)$

9) If $\log 2 = a$, $\log 3 = b$, then $\log_3 54$ =

A) $\frac{a + 3b}{b}$

B) $\frac{3a + b}{b}$

C) $\frac{2a + b}{a}$

D) $\frac{a + 2b}{a}$

E) $\frac{2a + 3b}{b}$

10) If $A = \sqrt[3]{25}$ and $B = \frac{\ln 8}{\ln 5}$, then A^B =

A) 4

B) 2

C) 3

D) 5

E) 8

11) $\log_3 x + 4 \log_9 (x+1) - \log_3 (x+1) - 1 =$

A) $\log_3 \left(\frac{x^2+x}{3}\right)$

B) $\log_3 \left(\frac{x}{3}\right)$

C) $\log_3 (x^2 + x - 1)$

D) $\log_3 \left(\frac{3}{x}\right)$

E) $\log_3 \left(\frac{3}{x^2+x-1}\right)$

12) Which one of the following statements is TRUE ?

A) $y = \log_{(a-1)} x$ is defined if $a > 1$, $a \neq 2$, and $x > 0$

B) $\log (abc) = (\log a)(\log b)(\log c)$

C) $\log (a + b + c) = \log (a) + \log (b) + \log (c)$

D) $\ln 7 - \ln 2 = \frac{\ln 7}{\ln 2}$

E) $\ln x^2 = 2 \ln x$, for any real number x

13) The sum of all the solution(s) of the equation

$\frac{1}{4}\log_x 81 + \log_x(x+6) = e^{-\ln(\frac{1}{2})}$, is :

A) 6

B) - 3

C) 3

D) 9

E) - 9

14) If the solution of the equation $\frac{7^x + 7^{-x}}{7^x - 7^{-x}} = 2$ is $x = \log_b \sqrt{a}$,

then $a \cdot b =$

A) 21

B) 34

C) 14

D) 9

E) 24

15) A pulley has a radius of 10 centimeters. If it takes 20 seconds for 60 centimeters of the belt to go around the pulley, then the angular speed of the pulley in radians per second, is equal to :

A) 0.3

B) 3

C) $\frac{10}{3}$

D) $\frac{1}{120}$

E) 120

16) If α is the reference angle of 1045° and β is the smallest positive coterminal angle with -510°, then $\alpha + \beta =$

A) 245°

B) 265°

C) 255°

D) 155°

E) 165°

17) The angle of elevation from the top of a short building to the top of a tall building is 60°, while the angle of depression to the bottom of the tall building is 30°. If the shorter building is 20 meters high, then the height of the tall building, in meters, is

A) 80

B) 60

C) $40\sqrt{3}$

D) $80\sqrt{3}$

E) $60\sqrt{3}$

18) If $\cot\theta = \frac{4}{5}$, $\sin\theta > 0$, then $82(\cos\theta)(\sin\theta) =$

A) 40

B) 20

C) 41

D) 80

E) 60

19) If the terminal side of an angle θ, in standard position, is defined by $x + 2y = 0$, $x \geq 0$, then $5 \sin\theta \cos\theta =$

A) -2

B) -5

C) 2

D) 5

E) 1

20) $\csc(-240^\circ) + \cot(\frac{56\pi}{3}) =$

A) $\frac{\sqrt{3}}{3}$

B) $-\frac{\sqrt{3}}{3}$

C) $\sqrt{3}$

D) $-\sqrt{3}$

E) 0