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1) If $f(x) = a^x$ and $f^{-1}(27) = 3$, then $f(-1) =$

A) $\dfrac{1}{3}$

B) a

C) 3

D) $\dfrac{1}{a}$

E) -3

2) The adjacent graph represents the function

A) $f(x) = 5 - 2^{-x}$

B) $f(x) = 5 + 2^{-x}$

C) $f(x) = -5 - 2^x$

D) $f(x) = 5 + 2^x$

E) $f(x) = 5 - 5^{-x}$

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3) The expression $2 - \log_2 (x^3) - 4 \log_4(y)$ can be written as :

A) $\log_2 \left(\dfrac{4}{x^3 \, y^2} \right)$

B) $\log_2 \left(\dfrac{\sqrt{2}}{x^3 \, y^8} \right)$

C) $\log_2 \left(\dfrac{2x^3}{y^2} \right)$

D) $\log_2 \left(\dfrac{4}{x^3 \, y^{16}} \right)$

E) $\log_2 \left(\dfrac{x^3 \, y^2}{4} \right)$

4) If $\log_3 (5)= a$ and $\log_3 (2)= b$, then $\log_{\sqrt{2}} (30) =$

A) $\dfrac{2 + 2a + 2b}{b}$

B) $\dfrac{2a + 2b + 2b^2}{b}$

C) $\dfrac{\sqrt{1 + a + b}}{b}$

D) $\dfrac{2a}{b^2}$

E) $2 + 2a + 2b$

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5) Which one of the following angles is NOT coterminal with 50° :

   A) 310°

   B) 410°

   C) -310°

   D) 770°

   E) -670°

6) If α is the complementary angle of $20^\circ 34' \ 15''$ and β is the supplementary angle of $30^\circ 25' 45''$, then $\alpha + \beta \ =$

   A) 219°

   B) 51°

   C) 217°

   D) 52°

   E) 218°

7) If $\sin 10° = k$, then $\cos(-640°) + \sin(-190°) =$

     A) $2k$

     B)   0

     C) $-2k$

     D) $-3k$

     E) $-k$

8) In the adjacent figure , the value of $2a + \dfrac{\sqrt{3}}{3} b - \sqrt{3}\, c =$

     A)   0

     B)   72

     C) -72

     D) $16\sqrt{3}$

     E) $40\sqrt{3}$

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9) The length of the arc that subtends the central angle of $9°$ in a circle of radius 20 centimeter is :

   A) π cm

   B) 2π cm

   C) 360 cm

   D) 180 cm.

   E) 1 cm.

10) The reference angle of $\theta = 2$ radians is equal to

   A) $\pi - 2$

   B) $2 - \pi$

   C) $2 + \pi$

   D) $2\pi - 2$

   E) $\dfrac{\pi}{2} - 2$

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11) If $h(x) = (gof)(x)$ where $f(x) = \dfrac{3}{x-3}$ and $g(x) = \dfrac{2}{x}$, then $h^{-1}(x) =$

A) $\dfrac{3}{2}x + 3$

B) $\dfrac{3}{2}x - 3$

C) $\dfrac{3x+2}{3x}$

D) $\dfrac{3x-2}{3x}$

E) $\dfrac{3}{x-3}$

12) The inverse of the quadratic function $f(x) = x^2 + 1$, $x \le 0$ is

A) $f^{-1}(x) = -\sqrt{x-1}$, $x \ge 1$

B) $f^{-1}(x) = -\sqrt{x-1}$, $x \ge 0$

C) $f^{-1}(x) = \sqrt{x+1}$, $x \ge -1$`

D) $f^{-1}(x) = \sqrt{x+1}$, $x \ge 0$

E) $f^{-1}(x) = \sqrt{x-1}$, $x \ge 1$

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13) The domain D and the range R of the function $f(x) = -\log_3(-x) - 2$ is

    A) $D:(-\infty, 0)$ and $R:(-\infty, \infty)$

    B) $D:(-\infty, 0)$ and $R:(-2, \infty)$

    C) $D:(0, \infty)$ and $R:(-\infty, \infty)$

    D) $D:(-\infty, 0)$ and $R:(0, \infty)$

    E) $D:(-2, \infty)$ and $R:(0, \infty)$

14) If $f(x) = |\log_2(x+3)|$, then which one of the following statements is
    FALSE :

    A) The graph of f is increasing on $(-3, 2)$

    B) The graph of f is increasing on $(-2, \infty)$

    C) The domain of f is $(-3, \infty)$

    D) The range of f is $[0, \infty)$

    E) The x - intercept of the graph of f is $(-2, 0)$

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15) The solution of the equation $3^{2X-1} = 5^{X+2}$ is equal to

A) $\dfrac{2\ln5 + \ln3}{2\ln3 - \ln5}$

B) $\dfrac{\ln5 + 2\ln3}{\ln5 - \ln3}$

C) $\dfrac{2\ln5 - \ln3}{2\ln3 - \ln5}$

D) $\dfrac{2\ln5 + \ln3}{\ln5 - \ln3}$

E) $\dfrac{\ln5 + \ln3}{\ln5 - \ln3}$

16) The solution set of the equation $\log(5 - x) + \log(-3 - x) = \log(1 - 8x)$ consists of

A) one negative real number .

B) one positive and one negative real numbers.

C) two positive real numbers.

D) two negative real numbers.

E) one positive real number.

17) If the terminal side of the angle θ in the standard position lies on the line $-5x - 3y = 0$, $x \leq 0$, then $\sin\theta + \cos\theta$ =

A) $\dfrac{\sqrt{34}}{17}$

B) $-\dfrac{4\sqrt{34}}{17}$

C) $\dfrac{5\sqrt{34}}{17}$

D) $-\dfrac{\sqrt{34}}{17}$

E) $-\dfrac{3}{5}$

18) $\tan\left(\dfrac{31\pi}{4}\right) - \cos\left(780^\circ\right)$ =

A) $-\dfrac{3}{2}$

B) $-\dfrac{1}{2}$

C) $\dfrac{3}{2}$

D) $\dfrac{1}{2}$

E) $\dfrac{-1-\sqrt{3}}{2}$

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19) Two buildings are 120 feet apart. The angle of elevation from the top of the shorter building to the top of the taller building is 40°. If the shorter building is 86 feet high , then the height of taller building is

A) 86 + 120 tan 40° feet

B) 86 + 120 cot 40° feet

C) 120 + 86 tan 40° feet

D) 120 + 86 cot 40° feet

E) 120 tan 40° feet

20) If a point is on the edge of a wheel of diameter 20 centimeters and rotating 80 revolution per second , then the linear speed of the point in centimeters per second is

A) 1600 π cm./sec.

B) 3200 π cm./sec.

C) $\dfrac{400}{\pi}$ cm./sec.

D) $\dfrac{\pi}{800}$ cm/sec.

E) $\dfrac{\pi}{400}$ cm./sec