1) Let $f(x) = x^2 - 6x + 4 \;,\; x \leq 3$, then

A) $f^{-1}(x) = 3 - \sqrt{x+5}$

B) $f^{-1}(x) = 6 - \sqrt{x+4}$

C) $f^{-1}(x) = 4 + \sqrt{x+5}$

D) $f^{-1}(x) = 3 - \sqrt{x-5}$

E) $f^{-1}(x) = 3 + \sqrt{x+5}$

2) Which one of the following statements is FALSE about the inverse functions?

A) If $f(2) = -5$, then $f(f^{-1}(-5)) = 2$

B) For a function to have an inverse, it must be a one-to-one function.

C) If the point (a,b) lies on the graph of f, then (b,a) lies on the graph of f^{-1}

D) The domain of f is equal to the range of f^{-1}

E) The graphs of f and f^{-1} are symmetric with respect to the line y = x.

3) If the function $f(x) = 2^{(ax+b)} + c$ represents the graph below, then

$a + b + c =$

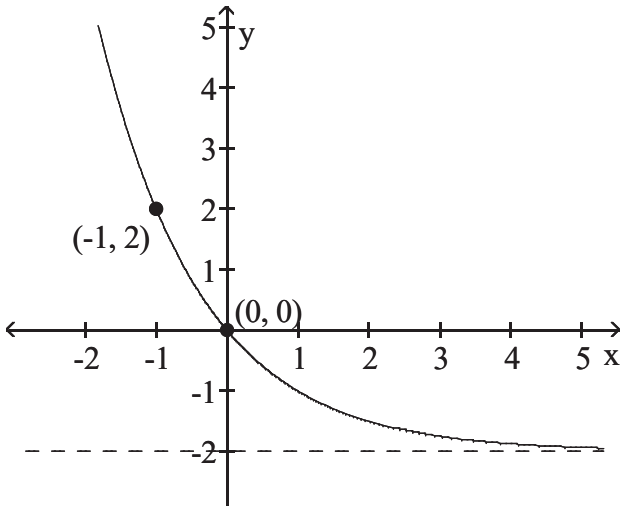
A) –2

B) –1

C) 0

D) 2

E) 1



4) The **Range** of the function $f(x) = -3^{|x|} + 2$ is

A) $(-\infty, 1]$

B) $(2, \infty)$

C) $(0, 2]$

D) $(-\infty, 2)$

E) $[-1, \infty)$

5) The expression $3 \log_5(2a) - 4 \log_{25}(b) - \frac{1}{2} \log_5(c)$ is equal to

A) $\log_5 \frac{8\, a^3}{b^2\, c^{1/2}}$

B) $\log_5 \frac{2\, a^3\, b^2}{c^{1/2}}$

C) $\log_5 \frac{2\, a^3}{b^2\, c^{1/2}}$

D) $\log_5 \frac{6\, a^3\, b^2}{c^{1/2}}$

E) $\log_5 \frac{8\, a\, b^2}{c^{1/2}}$

6) If the function $f(x) = \log_9(27 - x)$ has x–intercept (a, 0) and y–intercept (0, b), then $a + 2b =$

A) 29

B) 27

C) 25

D) 24

E) 26

7) Which one of the following statements is TRUE for all $x > 0, y > 0, b > 0$ and $b \neq 1$?

A) $\log_b \sqrt{x} = \dfrac{\ln x}{2 \ln b}$

B) $\log_b (x + y) = \log_b x + \log_b y$

C) $(\log_b x)(\log_b y) = \log_b (xy)$

D) $\log_b \left(\dfrac{x}{y}\right) = \dfrac{\log_b x}{\log_b y}$, $y \neq 1$

E) $\dfrac{\log_b x}{\log_b y} = \log_b x - \log_b y$, $y \neq 1$

8) If $A = 2^{\log_8 125}$ and $B = (\log_{\sqrt{2}} 9)\cdot(\log_3 \sqrt{8})$, then $B + A =$

A) 11

B) 1

C) 10

D) 0

E) 12

9) The equation $\log_2 (x - 2) = 2 - \log_2 (x + 1)$

A) only one positive real solution

B) two positive real solutions

C) only one negative real solution

D) two negative real solutions

E) one positive and one negative real solutions

10) The sum of the solutions of the equation $\frac{e^{-x} + 1}{e^{x} + 1} = \frac{1}{3}$ is

A) $\ln 3$

B) $\ln 6$

C) $\ln 3 + 1$

D) $\ln 2$

E) $\ln 3 - 1$

11) If α is the least positive **coterminal** angle with $415^\circ 45' 25''$, then the complement of α is

A) $34^\circ 14' 35''$

B) $124^\circ 14' 35''$

C) $34^\circ 24' 45''$

D) $124^\circ 24' 55''$

E) $114^\circ 14' 35''$

12) A tire is rotating 600 times per minute. Through how many **degrees** does a point on the edge of the tire move in 0.25 sec?

A) 900°

B) 800°

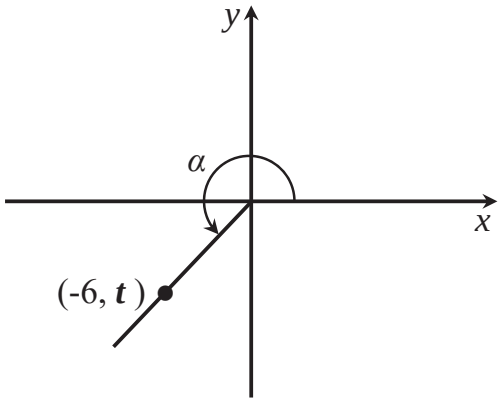
C) 700°

D) 600°

E) 500°

13) In the figure below, if $\sin\alpha = -\frac{4}{5}$, then the value of $\boldsymbol{t}$ is

A) – 8
B) – 6
C) – 4
D) – 3
E) – 2



14) Which one of the following statements is FALSE for any angle α in the domain of the functions ?

A) $\sin\alpha + \cos\alpha = 1$

B) $-1 \le \sin\alpha \le 1$

C) $1 \le |\sec\alpha|$

D) $1 \le |\csc\alpha|$

E) $-\infty < \tan\alpha < \infty$

15) In the adjacent figure, the value of $\frac{x \cdot y}{\sqrt{3}}$ is

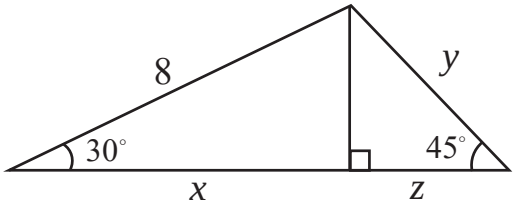
A) $16\sqrt{2}$

B) 32

C) 36

D) 24

E) $24\sqrt{3}$



16) If from the top of a 60 meter high tower the angles of depression to the top and the bottom of a shorter building opposite the tower are given by 30° and 60° respectively, then the height of the building is equal to:

A) 40 m

B) 20 m

C) 30 m

D) 35 m

E) 45 m

17) $\sin 218^\circ + \cos 52^\circ + \tan 675^\circ$ is equal to

A) -1

B) -2

C) 1

D) 2

E) 0

18) The arc length of $160\,\pi$ cm subtends a central angle of 320° in a circle of radius r. The radius r is equal to

A) 90 cm

B) 80 cm

C) 100 cm

D) 150 cm

E) 120 cm

19) If $\cos\theta = -\frac{2}{3}$, $\sin\theta < 0$, then $\csc\theta + \tan\theta$

A) $-\frac{\sqrt{5}}{10}$

B) $\frac{11\sqrt{5}}{10}$

C) $-\frac{\sqrt{13}}{10}$

D) $\frac{3\sqrt{5}}{10}$

E) $-\frac{7\sqrt{5}}{10}$

20) The value of $\theta = \frac{11\pi}{15}$ in degrees is equal to :

A) 132°

B) 135°

C) 137°

D) 138°

E) 139°