1) If $f^{-1}(x) = \frac{1}{2} - \sqrt{x + \frac{5}{4}}$, then $f\left(-\frac{1}{2}\right)$ is equal to

A) $-\frac{1}{4}$

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

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

D) $\frac{1 - \sqrt{3}}{2}$

E) $-\frac{5}{4}$

2) Which one of the following functions is NOT a one-to-one function?

A) $f(x) = \sqrt{(x - 2)^2}, \quad x \geq 0$

B) $f(x) = 2 - \sqrt{2x - 1}$

C) $f(x) = \frac{1}{x - 1} + 3$

D) $f(x) = x^2 - 2x + 1 \; ; x \leq 1$

E) $f(x) = (x - 1)^3$

3) If $f(x) = a^x$ is an exponential function and $f^{-1}\left(\frac{1}{9}\right) = -2$, then $f(4) =$

A) 81

B) 27

C) 16

D) $\frac{1}{3}$

E) $\frac{1}{16}$

4) The equation of the adjacent graph is

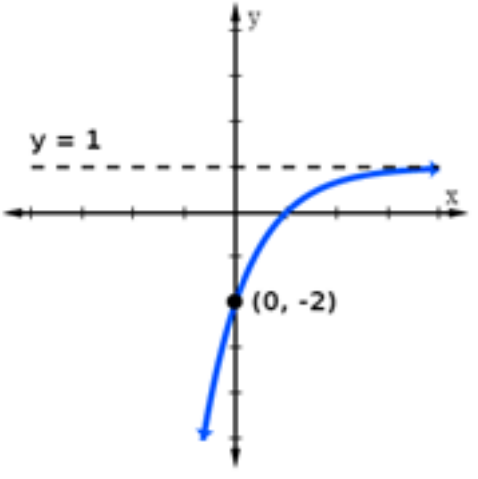
A) $y = -\left(\frac{1}{3}\right)^{x-1} + 1$

B) $y = -\left(\frac{1}{3}\right)^{x+1} + 1$

C) $y = -\left(\frac{1}{3}\right)^{x-1} - 1$

D) $y = -\left(\frac{1}{3}\right)^{x+1} - 1$

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



5) The graph of the function $f(x) = \left| - e^{-x} + 4 \right|$, is decreasing on the interval

A) $(- \infty , - 2 \ln 2)$

B) $(2 \ln 2, \infty)$

C) $(- \infty , \infty)$

D) $(- 2 \ln 2, \infty)$

E) $(- \infty , 2 \ln 2)$

6) The domain of the function $y = 3 + \log_2 \left(\frac{4 - 2x}{x - 1} \right)$, is

A) $(1, 2)$

B) $(- \infty, 1) \cup (2, \infty)$

C) $(- \infty, 1) \cup (1, \infty)$

D) $(- \infty, 1) \cup (4, \infty)$

E) $(1, 4)$

7) The graph of $f(x) = -\ln|x+2|$ lies above the x-axis on the interval

A) $(-3,-2)\cup(-2,-1)$

B) $(-\infty,-3)\cup(-1,\infty)$

C) $(-2,-1)\cup(-1,\infty)$

D) $(-2,0)$

E) $(-3,0)$

8) $\left(\frac{1}{10}\right)^{\log 3} + \log_{\frac{3}{2}}\left(\frac{8}{27}\right) =$

A) $-\frac{8}{3}$

B) 0

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

D) 6

E) $-\frac{2}{3}$

9) If $\log_3 (x + 1) = \frac{1}{2}$, then $\log_3 (3x^2 + 6x + 3) =$

A) 2

B) $\frac{3}{2}$

C) 4

D) $\frac{7}{2}$

E) $\frac{5}{2}$

10) Which one of the following statements is always TRUE for the real numbers $x > 0$, $y > 0$, $x \neq 1$ and $y \neq 1$?

A) $\frac{\ln x}{\ln y} = - \frac{\log_x x}{\log_x \frac{1}{y}}$

B) $\left(\log_y x\right)\left(\log_x y\right) = - 1$

C) $\left(\log_y x\right)^n = n \log_y x$

D) $\log_x \frac{1}{y} = \log_y x$

E) $\log_x (x + y^2) = 1 + 2 \log_x y$

11) The solution set of the equation $\log_4 (x + 2) - 2 \log_{\frac{1}{16}} (x - 1) = 1$

consists of

A) one positive integer only

B) one negative integer only

C) one positive irrational number only

D) two integers whose sum is -1

E) one negative irrational number only

12) The sum of all solution(s) of the equation $e^x - 12 e^{-x} - 1 = 0$, is

A) $\ln 4$

B) $\ln 12$

C) $\ln 3$

D) $1 + \ln 2$

E) $-\ln 12$

13) If an arc of length $\frac{16\pi}{3}$ cm subtends a central angle of measure $\theta°$ in a circle with diameter 24 cm, then θ =

A) 80

B) 40

C) 20

D) 160

E) 240

14) If the tires on a bicycle with radius 18 centimeters are rotating at 240 revolutions per minute, then the speed of the bicycle in centimeters per second is

A) $144\ \pi$

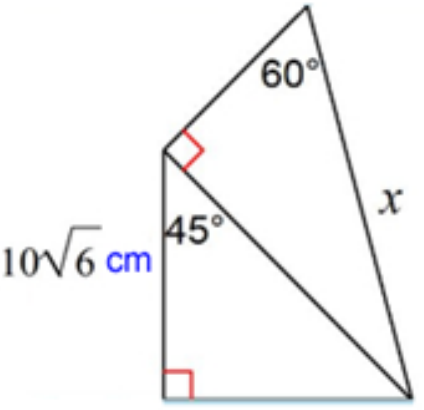
B) $72\ \pi$

C) $8\ \pi$

D) $216\ \pi$

E) $288\ \pi$

15) In the adjacent figure, x =



A) 40 cm

B) $40\sqrt{3}$ cm

C) $20\sqrt{3}$ cm

D) 20 cm

E) $20\sqrt{6}$ cm

16) A helicopter is flying 450 feet above the ground level. If the angle of depression from the helicopter to the base of a flagpole is θ, where $\sin\theta = \frac{5}{13}$, then the horizontal distance the helicopter must fly to be directly over the flagpole is

A) 1080 feet

B) 187.5 feet

C) 1170 feet

D) 173.1 feet

E) 487.5 feet

17) The exact value of $\sec(-480°) - \cot\frac{3\pi}{4}$ is

A) -1

B) -3

C) $\frac{3-2\sqrt{3}}{3}$

D) 3

E) $\frac{3+2\sqrt{3}}{3}$

18) If α is the reference angle of $-30°$ and β is the smallest positive coterminal angle of $-670°$, then $\alpha + \beta =$

A) $80°$

B) $380°$

C) $110°$

D) $200°$

E) $20°$

19) For the angle θ shown in the adjacent diagram, $\csc\theta + \cot\theta$ is equal to

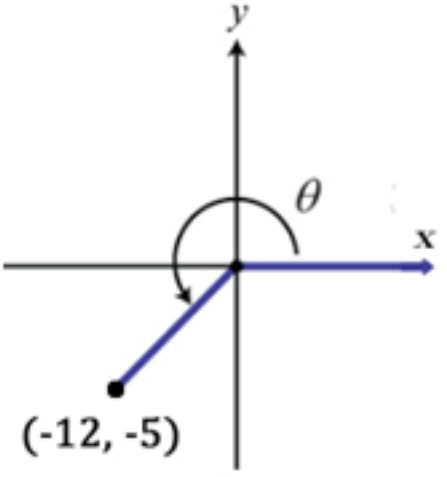
A) $-\frac{1}{5}$

B) -5

C) $-\frac{13}{5}$

D) $-\frac{3}{20}$

E) -3



20) If $f(x) = \frac{x^2 \sin x}{\sec^3 x}$ and $g(x) = \cot x$, then

A) f is an odd function and g is an odd function

B) f is an even function and g is an even function

C) f is an even function and g is an odd function

D) f is an odd function and g is an even function

E) f is an even function and g is neither an odd nor an even function