

1) If $f(x) = -\sqrt{x+2} + k$, and $f^{-1}(2) = 7$, then $f^{-1}(3) + (f^{-1} \circ f)(2) =$

A) 4

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

C) $\frac{11}{5}$

D) 0

E) 8

2) If $(\sqrt[4]{3})^{8x+12} = (e)^{3x \ln 3}$, then $x =$

A) 3

B) 4

C) -2

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

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

3) If the points (3, 4) and (4, 16) lie on the graph of $f(x) = b^{x+3c}$, then $f(2) =$

A) 1

B) - 2

C) 6

D) 7

E) - 6

4) If $y = \log(x+1) - \log x$, then $x =$

A) $\frac{1}{10^y - 1}$

B) $\frac{1}{10^y + 1}$

C) $10^y + 1$

D) $10^y - 1$

E) $\frac{1}{e^y - 1}$

- 5) The graph of $y = |\log(x + 1)^2|$ is increasing on the interval
- A) $(-2, -1) \cup (0, \infty)$
 - B) $(-\infty, -2) \cup (-1, 0)$
 - C) $(-2, \infty)$
 - D) $(-\infty, -2)$
 - E) $(-1, \infty)$
- 6) The x -intercept of the graph of the function $f(x) = e^{2\ln 3} + \ln e^{(\ln x - \ln 4)}$ is
- A) $4e^{-9}$
 - B) $9e^{-4}$
 - C) $-4e^{-9}$
 - D) $4e^9$
 - E) $-8 \ln 3$

7) If $\log_6 3 = a$, then $\log_2 108 =$

A) $\frac{a + 2}{1 - a}$

B) $\frac{a - 2}{1 - a}$

C) $\frac{a + 3}{1 - a}$

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

E) $\frac{a - 2}{1 + a}$

8) The graph of the function $y = 3\left(\frac{1}{3}\right)^{1-x} - 1$ is below the x-axis on the interval

A) $(-\infty, 0)$

B) $(0, \infty)$

C) $(-\infty, 1)$

D) $(1, \infty)$

E) $(0, 1)$

9) If the solution of the equation $2^{3x-2} = 5^{x+1}$ is $x = \frac{\ln a + \ln b}{\ln c - \ln b}$,

then $a + b + c =$

A) 17

B) 13

C) 11

D) 15

E) 19

10) The sum of all the solutions of the equation $2 \cdot 3^x - 21 \cdot 3^{-x} + 1 = 0$ is

A) 1

B) 3

C) $-\frac{1}{2}$

D) $\frac{9}{2}$

E) $\frac{1}{2}$

11) The sum of all the solutions of the equation

$$\frac{1}{2} \ln (3x + 8) = \frac{1}{2} \ln (2x + 2) + \frac{1}{4} \log_{\sqrt{e}} (x - 2) \quad \text{is}$$

A) 4

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

C) 3

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

E) 5

12) The sum of all coterminal angles with $\frac{2\pi}{3}$ between 2π and 6π is

A) $\frac{22\pi}{3}$

B) $\frac{21\pi}{3}$

C) $\frac{20\pi}{3}$

D) $\frac{13\pi}{3}$

E) $\frac{31\pi}{3}$

13) If $12x - 5y = 0$, $x \leq 0$, is the equation of the terminal side of an angle α , then $5 \tan \alpha - 12 \csc \alpha =$

A) 25

B) - 1

C) 15

D) 20

E) - 25

14) Which ONE of the following statements is IMPOSSIBLE ?

A) $\cot^2 \theta - \csc^2 \theta = 1$

B) $\tan \theta = \frac{22}{7}$

C) $\cot \theta = - 100$

D) $\cos \theta = - \frac{4}{7}$ and $\sec \theta = - \frac{7}{4}$

E) $\sin \theta = \frac{1}{5}$ and $\csc \theta = 5$

15) A 10 meters ladder is placed against a wall and forms an angle of 30° with the ground. If the foot of the ladder is moved toward the wall, the angle changes to 60° . The exact distance moved by the top of the ladder on the wall is

A) $5(\sqrt{3} - 1)$

B) $5(\sqrt{3} - \sqrt{2})$

C) $5(\sqrt{2} - 1)$

D) $5\sqrt{2}$

E) $5\sqrt{3}$

16) The exact value of $\sec(-480^\circ) + \csc\left(\frac{71\pi}{6}\right)$ is

A) -4

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

C) -2

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

E) -3

- 17) A point on the edge of a disc is 6 feet from the center. If the disc is rotating at 5 revolutions per minute, then the linear speed in feet per minute is
- A) 60π
 - B) 30
 - C) 30π
 - D) 120π
 - E) 120
- 18) If a 12π cm arc length subtends a central angle of measure 40° in a circle with radius r cm, then $r =$
- A) 54
 - B) 36
 - C) 24
 - D) 12
 - E) 72

19) If $\tan \theta = -\frac{4}{5}$ and $\sin \theta < 0$, then $\sec \theta - \csc \theta =$

A) $\frac{9\sqrt{41}}{20}$

B) $-\frac{9\sqrt{41}}{20}$

C) $\frac{\sqrt{41}}{20}$

D) $-\frac{\sqrt{41}}{20}$

E) $\frac{9\sqrt{41}}{41}$

20) If α is the reference angle of 845° and β is the least positive coterminal of -705° , then $\alpha + \beta =$

A) 70°

B) 80°

C) 180°

D) 160°

E) 150°