

1) On factor of the polynomial $p^2 - 9 - q^2 + 6q$ is

A) $p + q - 3$

B) $p - q - 3$

C) $p + q - 1$

D) $p - q - 1$

E) $p + q + 1$

2) The **sum** of the solution(s) of the equation $\frac{x-1}{x+6} - \frac{x-4}{x-3} = \frac{x^2}{x^2+3x-18}$ is

A) -9

B) -6

C) -3

D) 6

E) 12

3) The solution set, in interval notation, of the inequality $x + 2 \leq \frac{8}{x}$ is

A) $(-\infty, -4] \cup (0, 2]$

B) $(-\infty, -4] \cup [2, \infty)$

C) $[-4, 0) \cup (0, 2]$

D) $[-4, 0) \cup [2, \infty)$

E) $[-4, 2]$

4) If $2i$, where $i = \sqrt{-1}$, is a zero of $f(x) = 4x^4 - 4x^3 + 17x^2 - 16x + 4$, then the **number** of the x -intercepts for the graph of $f(x)$, is equal to

A) 1

B) 0

C) 2

D) 3

E) 4

5) If $y = \frac{3}{2}$ is the horizontal asymptote, and $x = -\frac{2}{3}$ is the x -intercept for

the graph of $r(x) = \frac{3x^2 - x + M}{Nx^2 - x - 1}$, then vertical asymptote(s) is/are

- A) $x = -\frac{1}{2}$
- B) $x = -\frac{1}{2}$ and $x = 1$
- C) $x = -2$ and $x = 1$
- D) $x = -\frac{2}{3}$ and $x = 1$
- E) $x = -\frac{2}{3}$

6) If $f(x) = 4 - \left(\frac{1}{2}\right)^{-m+x}$, where $f^{-1}(-4) = -2$, then $f^{-1}(2) =$

- A) 0
- B) 1
- C) 4
- D) -2
- E) -4

7) If $f^{-1}(x) = a \cdot \sqrt{x+b} + c$ is the inverse function of $f(x) = x^2 - 4x + 1$,
 $x < 2$, then $a + b + c =$

A) 4

B) 6

C) 1

D) 2

E) 0

8) If the point $(\frac{1}{16}, -4)$ lies on the graph of $f^{-1}(x)$, then the **base** a of the
exponential function $f(x) = a^x$, is

A) 2

B) 4

C) e

D) 3

E) undefined

9) The graph of the function $f(x) = \left| 2^{-x} - 2 \right|$ is **decreasing** on the interval

A) $(-\infty, -1)$

B) $(-\infty, \infty)$

C) $(-\infty, 1)$

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

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

10) The **range** of the function $f(x) = 3 - \left(\frac{1}{e}\right)^{|x-3|}$ is

A) $[2, 3)$

B) $(3, 4]$

C) $[3, 4)$

D) $(3, \infty)$

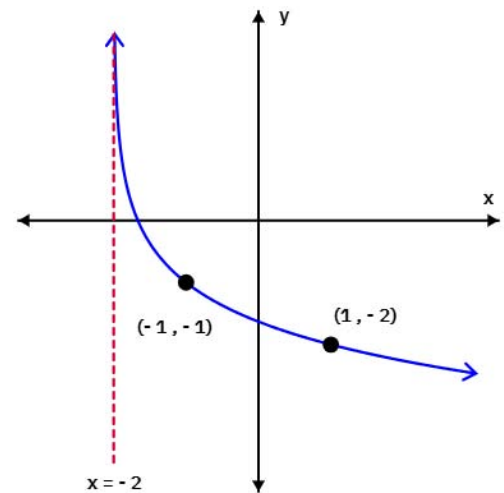
E) $(2, \infty)$

11) The **domain** of the function $\ln(x^3 - x)^2$ is

- A) $(-\infty, -1) \cup (-1, 0) \cup (0, 1) \cup (1, \infty)$
- B) $(-1, 0) \cup (0, 1) \cup (1, \infty)$
- C) $(-1, 0) \cup (1, \infty)$
- D) $(-\infty, -1) \cup (0, 1)$
- E) $(-1, 0) \cup (0, 1)$

12) The equation of the adjacent graph is

- A) $y = -1 - \log_3(x + 2)$
- B) $y = -1 - \log_2(x + 2)$
- C) $y = -1 - \log_{1/3}(x + 2)$
- D) $y = -1 - \log_{1/2}(x + 2)$
- E) $y = 1 - \log_{1/3}(x + 2)$



13) If $\log_5(3) = y$, then $\log_{\frac{1}{3}} 75 =$

A) $-\frac{2}{y} - 1$

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

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

D) $2y - 1$

E) $2y + 1$

14) If $\left(\frac{1}{9}\right)^{\log_3(2)} + \log_{\frac{1}{4}}\left(\frac{9}{16}\right) = \frac{Q}{R} - \log_R(Q)$, then $R - Q =$

A) -5

B) -3

C) 3

D) 8

E) 1

15) The **sum** of the solutions of the equation $3(2^{2x+1}) + 12 = 19(2^{x+1})$, is

- A) 1
- B) 0
- C) $\log_2 9$
- D) $-\log_2 9$
- E) $-\log_2 3$

16) The equation $\log_9(5-x) + \log_3 \sqrt{6-x} = \frac{1}{\log_{12}(9)}$ has

- A) only one positive real solution
- B) only one negative real solution
- C) two positive real solutions
- D) two negative real solutions
- E) no real solution

17) Which one of the following angles is NOT **coterminal** with $\frac{43\pi}{15}$?

A) -304°

B) 876°

C) 156°

D) -564°

E) -924°

18) A belt runs a pulley of diameter 10 centimeters. If it takes 10 seconds for the 20 centimeter belt to go round the pulley, then the angular speed of the pulley in radians per second is

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

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

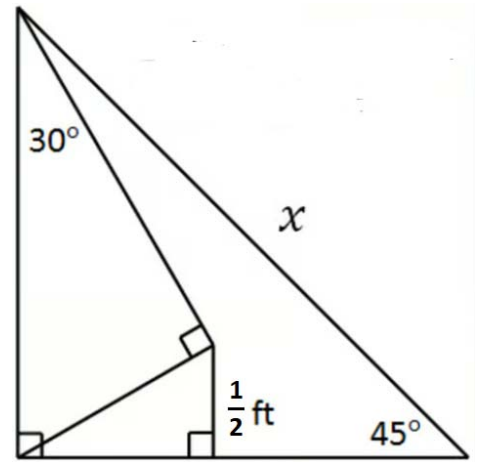
C) 10

D) 2

E) 5

19) In the adjacent figure, $x^2 =$

- A) 8 ft
- B) 4 ft
- C) 16 ft
- D) 18 ft
- E) 32 ft



20) If a $100\sqrt{3}$ - ft guy wire attached to the top of a communications tower makes an angle of 60° with the ground, then the height of the tower, is

- A) 150 ft
- B) 300 ft
- C) 600 ft
- D) 100 ft
- E) 200 ft