1) If $f(x) = a^{2x-3}$ and $f\left(\frac{1}{2}\right) = \frac{1}{4}$, then $f^{-1}(32) =$

A)   2

B)   4

C)   - 2

D)   - 4

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

2) The graph of the function $y = 3\sin|x|$, $-\pi \le x \le \dfrac{\pi}{2}$, is decreasing on the interval

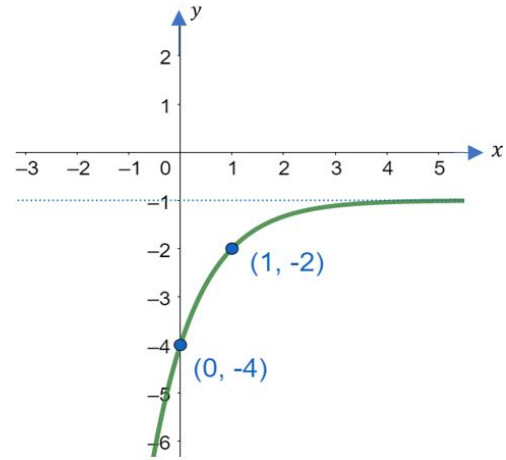A) $(-\pi, 0)$

B) $\left(-\dfrac{\pi}{2}, \dfrac{\pi}{2}\right)$

C) $\left(-\dfrac{\pi}{2}, 0\right)$

D) $\left(-\pi, -\dfrac{\pi}{2}\right)$

E) $\left(0, \dfrac{\pi}{2}\right)$

3) The equation of the adjacent graph is

A) $y = -3^{1-x} - 1$

B) $y = -3^{x+1} - 1$

C) $y = 3^{x-1} - 1$

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

E) $y = 3^{1+x} - 1$

4) If $(a, 0)$ and $(0, b)$ are points on the graph of the function
$f(x) = \log_3 (x + 1) - 1$, then $a + b =$

A) -2

B) 3

C) 1

D) -1

E) 2

5) $\tan^2 \dfrac{25\pi}{3} - \sec^2 60° + 1 =$

A)   0

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

C) $\dfrac{7}{4}$

D) $\dfrac{3}{4}$

E)   2

6) If θ in Quadrant III, then $\cot \theta =$

A) $-\dfrac{\sqrt{1 - \sin \theta}}{\sin \theta}$

B) $-\dfrac{\sqrt{1 - \sin^2 \theta}}{\sin \theta}$

C) $\dfrac{\sqrt{1 + \sin^2 \theta}}{\sin \theta}$

D) $-\dfrac{\sqrt{1 + \sin^2 \theta}}{\sin \theta}$

E) $\dfrac{\sqrt{1 - \sin^2 \theta}}{\sin \theta}$

7) The domain, in interval notation, of the function $f(x) = \ln(x - x^2)$ is

A)　　$(1, \infty)$

B)　　$(0, 1)$

C)　　$(-\infty, \infty)$

D)　　$(-\infty, 1)$

E)　　$(-\infty, 0)$

8) Suppose that the terminal side of the angle θ in standard position is given by $12x - 5y = 0$, $x \le 0$, then $\dfrac{60}{13}(\sec\theta + \csc\theta) =$

A)　 -17

B)　 -7

C)　　7

D)　 -8

E)　　17

9) If the point $\left(-\dfrac{1}{2}, \dfrac{\sqrt{3}}{2}\right)$ is on the terminal side of the angle θ in standard position, then $\tan \theta =$

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

B) -2

C) $-\sqrt{3}$

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

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

10) If $x = k$ is the solution of $\log_3\left(\log_4 (x - 36)\right) = 1$, then $\log k =$

A)   6

B) -1

C)   3

D)   2

E)   1

11) If x, y and z are positive real numbers, then,
$\log_5 x + 4 \log_{25} y - 3\log_5 z =$

A) $\log_5 \dfrac{x^2 y^4}{3z}$

B) $\log_5 \dfrac{xy^8}{z^6}$

C) $\log_5 \dfrac{x^2 y^4}{z^3}$

D) $\log_5 \dfrac{xy^4}{z^6}$

E) $\log_5 \dfrac{xy^2}{z^3}$

12) The graph of the function $f(x) = \left| \log_2(x - 2) \right|$ is decreasing on the interval

A) $(0, 2)$

B) $(-\infty, 2)$

C) $(2, 3)$

D) $(3, \infty)$

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

13) The number of x-intercepts of the graph of $y = -2\cos\pi x$, $-\dfrac{3}{2} \le x < \dfrac{5}{2}$, is

A)   5

B)   1

C)   3

D)   4

E)   2

14) The linear speed of a compact disc is 30π feet per minute. If the diameter of the disc is 10 feet, then the angular speed of the disc in revolutions per minute is

A)   3

B)   4

C)   6

D)   5

E)   2

15) If $f^{-1}(x) = -\sqrt{x+9}$, $x \geq -9$, then the graph of f lies below the x-axis on the interval

A) $[0, \infty)$

B) $(-9, 0]$

C) $(-3, 0]$

D) $(3, \infty)$

E) $(-\infty, 0]$

16) A 10 meters ladder is placed against a wall and forms an angle of 45° with the ground. If the foot of the ladder is moved away from the wall the angle changes to $30°$. The exact distance moved by the top of the ladder on the wall is

A) $5\sqrt{3} + 1$

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

C)   5

D) $3\sqrt{5} - 1$

E) $5\sqrt{2}$

17) The sum of all the solution(s) of $\log (x + 2) = 1 + \log_{0.1}(x - 1)$ is

A)   - 1

B)   1

C)   0

D)   - 3

E)   3

18) Let $x > 1$. If $\log_{0.5}(x - 1) = a$, then $\log_8\left(2x^2 - 4x + 2\right)$

A) $\dfrac{1 + 2a}{3}$

B) $\dfrac{2a - 1}{3}$

C) $1 - 2a$

D) $\dfrac{1 - 2a}{3}$

E) $\dfrac{1 - 2a}{6}$

19)   If $x = a$ is the solution of the equation $125^x + 5^{3x+1} = 12$, then $3a =$

   A)   3

   B) $\log_5 2$

   C) $\log_5 3$

   D)   0

   E)   2

20)   If $\theta = 12$ rad, then $\csc \theta =$

   A) $-\csc (4\pi - 12)$

   B) $\csc \left(\dfrac{\pi}{2} - 12\right)$

   C) $\csc \left(12 - \dfrac{\pi}{2}\right)$

   D) $\csc \left(12 - \dfrac{7\pi}{3}\right)$

   E) $\csc (4\pi - 12)$

1) B
2) C
3) A
4) C
5) A
6) B
7) B
8) A
9) C
10) D
11) E
12) C
13) D
14) A
15) C
16) B
17) E
18) D
19) B
20) A