1) If the points (1, 8) and $(a, -6)$ are the endpoints of a diameter of a circle centred at $(3, k)$, then an **equation** of the circle is

A) $x^2 + y^2 - 6x - 2y - 43 = 0$

B) $x^2 + y^2 + 3x + 2y + 43 = 0$

C) $x^2 + y^2 - 6x + 2y - 53 = 0$

D) $x^2 + y^2 + 6x - 2y + 53 = 0$

E) $x^2 + y^2 - 3x - 2y + 43 = 0$

2) The equation $2x^2 + 2y^2 - 2x + 8y = -\frac{1}{2}$ represents

A) a circle with center $(\frac{1}{2}, -2)$, and radius 2

B) a circle with center $(-\frac{1}{2}, 2)$, and radius 2

C) a circle with center $(-\frac{1}{2}, 2)$, and radius 3

D) a circle with center $(1, -8)$, and radius $\sqrt{3}$

E) a circle with center $(\frac{1}{2}, -2)$, and radius $-\frac{\sqrt{2}}{2}$

3) The graph of the equation $x^2y^2 - x^3y^3 = 1$ is **symmetric** with respect to

A) the origin only

B) the x – axis only

C) the y – axis only

D) the x–axis and the y–axis only

E) not symmetric with respect to the x–axis, y–axis, and the origin

4) The ***x*–intercept** of the line that passes through the point $(-2, -11)$ and perpendicular to the line passing through the points (1, 1) and (5, –1) is equal to

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

B) $-\frac{7}{2}$

C) $\frac{15}{2}$

D) $-\frac{15}{2}$

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

5) If the line $-ax-3y+c=0$ has y-intercept 6, and parallel to the line $2x+3y+4=0$, then $a+c=$

A) 20

B) 17

C) -20

D) -17

E) -9

6) If the equation $3x(4x-3)=8x-6$ has two solutions x_1 and x_2 such that $x_1>x_2$, then $4x_1+3x_2=$

A) 5

B) -8

C) 4

D) -4

E) 10

7) By completing the square of the equation $x^2 = 2\sqrt{3}\,x$, we get $(x + a)^2 = b$, then $a^2 + b =$

A) 6

B) 0

C) 4

D) 8

E) 10

8) If $a \neq 0$, then **one solution** of the quadratic equation $ax^2 - (2a + 1)x + (a + 1) = 0$ is

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

B) $\dfrac{a}{a + 1}$

C) $\dfrac{a - 1}{a}$

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

E) -1

9) If $(\sqrt[3]{-27})(\sqrt{-16})(i^{15}) + \dfrac{1+i}{1-i} = a + bi$, then $a + b =$

A) -11

B) 11

C) 10

D) 18

E) 21

10) The solution set, in interval notation, of the inequality
$-\dfrac{1}{6} < \dfrac{3-5x}{12} \leq \dfrac{2}{3}$ is

A) $[-1, 1)$

B) $(-1, 1]$

C) $(-1, 1)$

D) $(-2, 0]$

E) $[-2, 0)$

11) The **sum** of all the solutions of the equation $\dfrac{1+\dfrac{3}{x}}{2-\dfrac{1}{x}} = \dfrac{3}{2}x$, is

A) $\dfrac{5}{6}$

B) $-\dfrac{13}{6}$

C) $-\dfrac{5}{6}$

D) $\dfrac{11}{6}$

E) $\dfrac{13}{6}$

12) If $c > 0$, then the **sum** of all the solutions of $\big|\,|x-1|-c\,\big| = 0$ is

A) 2

B) $3c$

C) 1

D) $2c$

E) 0

13) The **sum** of all solutions of $\left|\sqrt{3}x - \sqrt{12}\right|^2 - 7\left|x - 2\right| = 6$ is

A) 4

B) 2

C) -4

D) -5

E) 5

14) Given the function $f(x) = \begin{cases} -3 & \text{if } x < -1 \\ [\![2x - 2]\!] & \text{if } -1 \le x < 4 \\ |3 - x| & \text{if } x \ge 4 \end{cases}$, where $[\![\ \ ]\!]$ represents the integer function, then $f(-2) + f(\pi) + f(5) =$

A) 3

B) $1 + 2\pi$

C) $3 - 2\pi$

D) 2

E) 0

15) *If* $f(x) = x - 5$, then the difference quotient $\dfrac{f(x) - f(x-h)}{h}$, $h \neq 0$, is

A) 1

B) -1

C) $-h$

D) h

E) $h + 5$

16) The relation $|y| = x$ is a function if

A) $y > 0$

B) $0 < x < 4$

C) $x > 0$

D) $y < 4$

E) $y > -1$

17) The domain D, and range R of the function $y = -\sqrt{9 - x^2}$ are

A) $D = [-3, 3]$, $R = [-3, 0]$

B) $D = [-9, 9]$, $R = [-3, 0]$

C) $D = [0, 3]$, $R = [0, 3]$

D) $D = [-3, 0]$, $R = [-3, 3]$

E) $D = [-3, 3]$, $R = [0, 3]$

18) The solution set of the equation $\sqrt{3 - x} + 2 = 1 + x$, consists of

A) one positive integer only

B) two positive integers

C) one negative integer only

D) one positive and one negative integers

E) two negative integers

19) The solution set, in interval notation, of the inequality $\frac{2x+1}{x-3} \leq 1$ is

A) $[-4, 3)$

B) $(-\infty, -4] \cup (3, \infty)$

C) $(-\infty, -4]$

D) $[-4, \infty)$

E) $[-3, 4)$

20) The graph of the function $f(x) = \begin{cases} x^2 & \text{if } x \leq 2 \\ -2x+1 & \text{if } x > 2 \end{cases}$ is **decreasing** on the interval

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

B) $(0, 2)$

C) $(-\infty, 2)$

D) $(0, \infty)$

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

Answer Key
Testname: MAJOR #2-----001----172 CODE 000

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