King Fahd University of Petroleum and Minerals
Prep-Math Program

MATH 001
SECOND MAJOR
TERM 231
11 NOVEMBER 2023

EXAM COVER

Number of versions: 4
Number of questions: 20

King Fahd University of Petroleum and Minerals
Prep-Math Program
MATH 001
SECOND MAJOR
TERM 231
11 NOVEMBER 2023
Net Time Allowed: 100 minutes

MASTER VERSION

1. The **sum** of all the real solution(s) of the equation $(x+1)^{\frac{2}{3}} + 3 = 12$ is

(a) -2 _____(correct)
(b) 3
(c) -4
(d) -9
(e) 27

2. If $x = -\frac{5}{9}$ is the solution of the equation $\frac{2}{x} - 4 = 5 + \frac{k}{x}$, then $k =$

(a) 7 _____(correct)
(b) 2
(c) -2
(d) 8
(e) -3

3. If $a < b$, then the **distance** between the points $(1, a)$ and $(1, 2b - a)$ is equal to

(a) $2(b - a)$ _____(correct)
(b) $2(a - b)$
(c) $4(a - b)$
(d) $2(a + b)$
(e) $2b$

4. Let $M(x, y)$ be the **midpoint** of the line segment that joins the points $(3, 4)$ and $(k, 6)$. If $x + y = 1$, then the value of k is equal to

(a) -11 _____(correct)
(b) -4
(c) -6
(d) 8
(e) 5

5. If $x^2+y^2+2x+y-1=k$ represents an **equation of a circle**, then the value(s) of k is (are)

(a) $\left(-\frac{9}{4},\infty\right)$ _____(correct)

(b) $\left(-\infty,-\frac{9}{4}\right)$

(c) $-\frac{9}{4}$

(d) $(-\infty,-4)$

(e) $-\frac{11}{4}$

6. The graph of the equation $|y|=(x-y)^2$ is

(a) symmetric with respect to the origin only _____(correct)

(b) symmetric with respect to the x-axis only

(c) symmetric with respect to the y-axis only

(d) symmetric with respect to the x-axis and y-axis

(e) not symmetric with respect to the x-axis, y-axis and origin

7. If the line $ax + by + \frac{5}{2} = 0$ with the y-intercept $-\frac{5}{6}$ is parallel to the line $2x + 3y = 16$, then $a + b =$

(a) 5 _____ (correct)

(b) -5

(c) -10

(d) -8

(e) 10

8. If $x = \frac{1}{2}$ is one of the solutions of the quadratic equation $2x^2 + x + k = 0$, then the other solution is

(a) -1 _____ (correct)

(b) 1

(c) 2

(d) -2

(e) 0

9. A farmer has a rectangular garden plot surrounded by $30\ m$ of fence. If the area of the garden is $36\ m^2$, then the **dimensions** of the garden are

   (a) $3\ m$ and $12\ m$ _____(correct)

   (b) $4\ m$ and $11\ m$

   (c) $4\ m$ and $9\ m$

   (d) $5\ m$ and $10\ m$

   (e) $6\ m$ and $6\ m$

10. For $i = \sqrt{-1}$, the expression

$$\left(\sqrt[3]{-8}\right)\left(\sqrt{-9}\right) - \frac{1+i^7}{1+i} =$$

   (a) $-5i$ _____(correct)

   (b) $-6+i$

   (c) $-6-i$

   (d) $-7i$

   (e) $6+i$

11. The solution set of the equation $\sqrt{3x+1} - \sqrt{x+1} = 2$ consists of

(a) only one positive integer _____(correct)
(b) only one negative integer
(c) two positive integers
(d) two negative integers
(e) two nonnegative integers

12. The solution set of the equation $\dfrac{x-1}{x^2-1} = \dfrac{1}{2}$ consists of

(a) no real numbers _____(correct)
(b) only one positive integer
(c) only one negative integer
(d) one positive and one negative integers
(e) two negative integers

13. The solution set of the inequality $x + \dfrac{1}{x} \geq 0$ is

(a) $(0, \infty)$ _____ (correct)
(b) $[0, \infty)$
(c) $[-1, 1]$
(d) $(-\infty, -1] \cup (0, 1]$
(e) $[-1, 0) \cup [1, \infty)$

14. The solution set of the inequality $x^2 - 2x + 1 \leq 0$ is

(a) $\{1\}$ _____ (correct)
(b) $\emptyset$
(c) $(-\infty, \infty)$
(d) $(-\infty, 1)$
(e) $(-\infty, 1) \cup (1, \infty)$

15. The solution set of the inequality $4 - 2\left|x - \frac{1}{2}\right| < 5$ is

(a) $(-\infty, \infty)$ (correct)
(b) $\left(-\infty, \frac{1}{2}\right)$
(c) $[0, 1]$
(d) $\emptyset$
(e) $\left(-\frac{1}{2}, \infty\right)$

16. The **number** of the solution(s) for the equation $|x+3|^2 + |x+3| = 0$ is equal to

(a) 1 (correct)
(b) 0
(c) 2
(d) 3
(e) 4

17. If $f(x) = \begin{cases} 1 - \lfloor 2x \rfloor \ , & \text{if } x < -3 \ ; \\ \\ 16x^2 - 1 \ , & \text{if } x \geq -3 \ , \end{cases}$

where $\lfloor x \rfloor$ **is the greatest integer function** of x , then $f(-\pi) =$

(a) 8 (correct)

(b) 7

(c) $16\pi^2 - 1$

(d) -7

(e) -6

18. Which one of the following does NOT define y as a function of x ?

(a) $4x = \sqrt{y^2}$ (correct)

(b) $xy = 5$

(c) $x^2 - 1 = \sqrt{y}$

(d) $|x| - y = 3$

(e) $\{(2, 5), (3, 3), (4, 4), (5, 2)\}$

19. The graph of the function $f(x) = \begin{cases} |x| \ , & \text{if } x \leq 1 \ ; \\ \\ 5 \ , & \text{if } x > 1 \ , \end{cases}$ is **increasing** on the interval

(a) $(0, 1)$ (correct)

(b) $(1, \infty)$

(c) $(-\infty, 0)$

(d) $(-\infty, \infty)$

(e) $(0, \infty)$

20. If $f(x) = \dfrac{1}{x+1}$, then the difference quotient $\dfrac{f(1) - f(h+1)}{h} =$

(a) $\dfrac{1}{2(h+2)}$ (correct)

(b) $\dfrac{-1}{2(h+2)}$

(c) $\dfrac{h}{h+2}$

(d) $\dfrac{-1}{h+2}$

(e) $\dfrac{h}{2h+2}$

King Fahd University of Petroleum and Minerals
Prep-Math Program

CODE001 **CODE001**

MATH 001
SECOND MAJOR
TERM 231
11 NOVEMBER 2023
Net Time Allowed: 100 minutes

Name			
ID		**Sec**	

Check that this exam has 20 questions

Important Instructions:

1. All types of calculators, smart watches, mobile phones, or any other electronic devices are NOT allowed during the examination.
2. Use HB 2.5 pencils only.
3. Use a good eraser. DO NOT use the erasers attached to the pencil.
4. Write your name, ID number and Section number on the examination paper and in the upper left corner of the answer sheet.
5. When bubbling your ID number and Section number, be sure that the bubbles match with the numbers that you write.
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7. When bubbling, make sure that the bubbled space is fully covered.
8. When erasing a bubble, make sure that you do not leave any trace of penciling.

1. If $x^2+y^2+2x+y-1=k$ represents an **equation of a circle**, then the value(s) of k is (are)

   (a) $\left(-\frac{9}{4},\infty\right)$
   (b) $(-\infty,-4)$
   (c) $-\frac{9}{4}$
   (d) $\left(-\infty,-\frac{9}{4}\right)$
   (e) $-\frac{11}{4}$

2. If $f(x)=\begin{cases} 1-\lfloor 2x\rfloor\ , & \text{if } x<-3\ ; \\ 16x^2-1\ , & \text{if } x\geq -3\ , \end{cases}$
   where $\lfloor x\rfloor$ **is the greatest integer function** of x , then $f\left(-\pi\right)=$

   (a) $16\pi^2-1$
   (b) -7
   (c) 8
   (d) -6
   (e) 7

3. If $x = -\frac{5}{9}$ is the solution of the equation $\frac{2}{x} - 4 = 5 + \frac{k}{x}$, then $k =$

(a) -3
(b) 2
(c) -2
(d) 7
(e) 8

4. The solution set of the equation $\sqrt{3x+1} - \sqrt{x+1} = 2$ consists of

(a) only one negative integer
(b) only one positive integer
(c) two nonnegative integers
(d) two positive integers
(e) two negative integers

5. The solution set of the equation $\dfrac{x-1}{x^2-1} = \dfrac{1}{2}$ consists of

(a) only one positive integer
(b) only one negative integer
(c) one positive and one negative integers
(d) no real numbers
(e) two negative integers

6. The solution set of the inequality $4 - 2\left|x - \frac{1}{2}\right| < 5$ is

(a) $\left(-\infty, \frac{1}{2}\right)$
(b) $(-\infty, \infty)$
(c) $[0, 1]$
(d) $\emptyset$
(e) $\left(-\frac{1}{2}, \infty\right)$

7. The solution set of the inequality $x + \frac{1}{x} \geq 0$ is

(a) $(-\infty, -1] \cup (0, 1]$
(b) $[-1, 0) \cup [1, \infty)$
(c) $(0, \infty)$
(d) $[0, \infty)$
(e) $[-1, 1]$

8. A farmer has a rectangular garden plot surrounded by $30\ m$ of fence. If the area of the garden is $36\ m^2$, then the **dimensions** of the garden are

(a) $4\ m$ and $11\ m$
(b) $4\ m$ and $9\ m$
(c) $3\ m$ and $12\ m$
(d) $5\ m$ and $10\ m$
(e) $6\ m$ and $6\ m$

9. Let $M(x, y)$ be the **midpoint** of the line segment that joins the points $(3, 4)$ and $(k, 6)$. If $x + y = 1$, then the value of k is equal to

(a) -4
(b) 5
(c) -6
(d) 8
(e) -11

10. If $x = \frac{1}{2}$ is one of the solutions of the quadratic equation $2x^2 + x + k = 0$, then the other solution is

(a) 2
(b) 0
(c) 1
(d) -1
(e) -2

11. The graph of the equation $|y| = (x - y)^2$ is

(a) not symmetric with respect to the x-axis, y-axis and origin
(b) symmetric with respect to the x-axis only
(c) symmetric with respect to the x-axis and y-axis
(d) symmetric with respect to the origin only
(e) symmetric with respect to the y-axis only

12. The **sum** of all the real solution(s) of the equation $(x + 1)^{\frac{2}{3}} + 3 = 12$ is

(a) 27
(b) -4
(c) -2
(d) 3
(e) -9

13. The **number** of the solution(s) for the equation $|x+3|^2 + |x+3| = 0$ is equal to

(a) 1
(b) 4
(c) 2
(d) 0
(e) 3

14. If the line $ax + by + \frac{5}{2} = 0$ with the y-intercept $-\frac{5}{6}$ is parallel to the line $2x + 3y = 16$, then $a + b =$

(a) -10
(b) 10
(c) 5
(d) -8
(e) -5

15. If $f(x) = \dfrac{1}{x+1}$, then the difference quotient $\dfrac{f(1) - f(h+1)}{h} =$

(a) $\dfrac{1}{2(h+2)}$

(b) $\dfrac{h}{h+2}$

(c) $\dfrac{-1}{2(h+2)}$

(d) $\dfrac{h}{2h+2}$

(e) $\dfrac{-1}{h+2}$

16. If $a < b$, then the **distance** between the points $(1, a)$ and $(1, 2b-a)$ is equal to

(a) $2(a+b)$

(b) $2b$

(c) $4(a-b)$

(d) $2(b-a)$

(e) $2(a-b)$

17. For $i = \sqrt{-1}$, the expression

$$\left(\sqrt[3]{-8}\right)\left(\sqrt{-9}\right) - \frac{1+i^7}{1+i} =$$

(a) $-6+i$
(b) $6+i$
(c) $-7i$
(d) $-5i$
(e) $-6-i$

18. The solution set of the inequality $x^2 - 2x + 1 \leq 0$ is

(a) $(-\infty, 1)$
(b) $\{1\}$
(c) $(-\infty, 1) \cup (1, \infty)$
(d) $(-\infty, \infty)$
(e) $\emptyset$

19. Which one of the following does NOT define y as a function of x ?

(a) $4x = \sqrt{y^2}$
(b) $|x| - y = 3$
(c) $x^2 - 1 = \sqrt{y}$
(d) $\{(2,5),(3,3),(4,4),(5,2)\}$
(e) $xy = 5$

20. The graph of the function $f(x) = \begin{cases} |x| \ , & \text{if } x \leq 1 \ ; \\ 5 \ , & \text{if } x > 1 \ , \end{cases}$ is **increasing** on the interval

(a) $(-\infty, 0)$
(b) $(0, 1)$
(c) $(0, \infty)$
(d) $(1, \infty)$
(e) $(-\infty, \infty)$

King Fahd University of Petroleum and Minerals
Prep-Math Program

CODE002 **CODE002**

MATH 001
SECOND MAJOR
TERM 231
11 NOVEMBER 2023
Net Time Allowed: 100 minutes

Name			
ID		**Sec**	

Check that this exam has 20 questions

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8. When erasing a bubble, make sure that you do not leave any trace of penciling.

1. If the line $ax + by + \frac{5}{2} = 0$ with the y-intercept $-\frac{5}{6}$ is parallel to the line $2x + 3y = 16$, then $a + b =$

   (a) 10
   (b) -5
   (c) -10
   (d) -8
   (e) 5

2. If $a < b$, then the **distance** between the points $(1, a)$ and $(1, 2b - a)$ is equal to

   (a) $2(a + b)$
   (b) $2(a - b)$
   (c) $2b$
   (d) $4(a - b)$
   (e) $2(b - a)$

3. If $x = -\frac{5}{9}$ is the solution of the equation $\frac{2}{x} - 4 = 5 + \frac{k}{x}$, then $k =$

(a) -2
(b) 7
(c) 2
(d) 8
(e) -3

4. The solution set of the inequality $x + \frac{1}{x} \geq 0$ is

(a) $[-1, 0) \cup [1, \infty)$
(b) $[0, \infty)$
(c) $[-1, 1]$
(d) $(0, \infty)$
(e) $(-\infty, -1] \cup (0, 1]$

5. If $f(x) = \dfrac{1}{x+1}$, then the difference quotient $\dfrac{f(1) - f(h+1)}{h} =$

(a) $\dfrac{-1}{2(h+2)}$

(b) $\dfrac{h}{h+2}$

(c) $\dfrac{1}{2(h+2)}$

(d) $\dfrac{-1}{h+2}$

(e) $\dfrac{h}{2h+2}$

6. A farmer has a rectangular garden plot surrounded by $30\ m$ of fence. If the area of the garden is $36\ m^2$, then the **dimensions** of the garden are

(a) $4\ m$ and $9\ m$

(b) $3\ m$ and $12\ m$

(c) $5\ m$ and $10\ m$

(d) $4\ m$ and $11\ m$

(e) $6\ m$ and $6\ m$

7. The solution set of the equation $\sqrt{3x+1} - \sqrt{x+1} = 2$ consists of

   (a) only one negative integer
   (b) only one positive integer
   (c) two negative integers
   (d) two positive integers
   (e) two nonnegative integers

8. Let $M(x, y)$ be the **midpoint** of the line segment that joins the points $(3, 4)$ and $(k, 6)$. If $x + y = 1$, then the value of k is equal to

   (a) 5
   (b) -11
   (c) 8
   (d) -6
   (e) -4

9. If $x^2+y^2+2x+y-1=k$ represents an **equation of a circle**, then the value(s) of k is (are)

(a) $-\dfrac{11}{4}$

(b) $\left(-\infty,-\dfrac{9}{4}\right)$

(c) $(-\infty,-4)$

(d) $\left(-\dfrac{9}{4},\infty\right)$

(e) $-\dfrac{9}{4}$

10. The graph of the function $f(x)=\begin{cases} |x|\ , & \text{if } x\le 1\ ; \\ 5\ , & \text{if } x>1\ , \end{cases}$ is **increasing** on the interval

(a) $(0,\infty)$

(b) $(-\infty,\infty)$

(c) $(1,\infty)$

(d) $(0,1)$

(e) $(-\infty,0)$

11. The solution set of the inequality $x^2 - 2x + 1 \leq 0$ is

(a) $\emptyset$
(b) $(-\infty, 1)$
(c) $\{1\}$
(d) $(-\infty, 1) \cup (1, \infty)$
(e) $(-\infty, \infty)$

12. The solution set of the inequality $4 - 2\left|x - \frac{1}{2}\right| < 5$ is

(a) $(-\infty, \infty)$
(b) $\emptyset$
(c) $\left(-\infty, \frac{1}{2}\right)$
(d) $[0, 1]$
(e) $\left(-\frac{1}{2}, \infty\right)$

13. The **sum** of all the real solution(s) of the equation $(x+1)^{\frac{2}{3}} + 3 = 12$ is

(a) 3
(b) -4
(c) -2
(d) 27
(e) -9

14. If $x = \frac{1}{2}$ is one of the solutions of the quadratic equation $2x^2 + x + k = 0$, then the other solution is

(a) -1
(b) 2
(c) 0
(d) 1
(e) -2

15. For $i = \sqrt{-1}$, the expression

$$\left(\sqrt[3]{-8}\right)\left(\sqrt{-9}\right) - \frac{1+i^7}{1+i} =$$

(a) $-5i$
(b) $6+i$
(c) $-6-i$
(d) $-6+i$
(e) $-7i$

16. The **number** of the solution(s) for the equation $|x+3|^2 + |x+3| = 0$ is equal to

(a) 1
(b) 3
(c) 0
(d) 4
(e) 2

17. If $f(x) = \begin{cases} 1 - \lfloor 2x \rfloor \ , & \text{if } x < -3 \ ; \\ \\ 16x^2 - 1 \ , & \text{if } x \geq -3 \ , \end{cases}$
where $\lfloor x \rfloor$ **is the greatest integer function** of x , then $f(-\pi) =$

(a) -7
(b) 7
(c) 8
(d) -6
(e) $16\pi^2 - 1$

18. The graph of the equation $|y| = (x - y)^2$ is

(a) symmetric with respect to the origin only
(b) symmetric with respect to the y-axis only
(c) symmetric with respect to the x-axis only
(d) symmetric with respect to the x-axis and y-axis
(e) not symmetric with respect to the x-axis, y-axis and origin

19. The solution set of the equation $\dfrac{x-1}{x^2-1} = \dfrac{1}{2}$ consists of

(a) two negative integers
(b) only one positive integer
(c) only one negative integer
(d) no real numbers
(e) one positive and one negative integers

20. Which one of the following does NOT define y as a function of x ?

(a) $|x| - y = 3$
(b) $x^2 - 1 = \sqrt{y}$
(c) $xy = 5$
(d) $\{(2,5),(3,3),(4,4),(5,2)\}$
(e) $4x = \sqrt{y^2}$

King Fahd University of Petroleum and Minerals
Prep-Math Program

CODE003 **CODE003**

MATH 001
SECOND MAJOR
TERM 231
11 NOVEMBER 2023
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Name			
ID		**Sec**	

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8. When erasing a bubble, make sure that you do not leave any trace of penciling.

1. If $f(x) = \dfrac{1}{x+1}$, then the difference quotient $\dfrac{f(1) - f(h+1)}{h} =$

   (a) $\dfrac{-1}{2(h+2)}$
   (b) $\dfrac{h}{h+2}$
   (c) $\dfrac{h}{2h+2}$
   (d) $\dfrac{-1}{h+2}$
   (e) $\dfrac{1}{2(h+2)}$

2. The **sum** of all the real solution(s) of the equation $(x+1)^{\frac{2}{3}} + 3 = 12$ is

   (a) 3
   (b) -4
   (c) -9
   (d) -2
   (e) 27

3. A farmer has a rectangular garden plot surrounded by $30\ m$ of fence. If the area of the garden is $36\ m^2$, then the **dimensions** of the garden are

   (a) $3\ m$ and $12\ m$
   (b) $6\ m$ and $6\ m$
   (c) $4\ m$ and $11\ m$
   (d) $4\ m$ and $9\ m$
   (e) $5\ m$ and $10\ m$

4. The solution set of the equation $\dfrac{x-1}{x^2-1} = \dfrac{1}{2}$ consists of

   (a) only one positive integer
   (b) one positive and one negative integers
   (c) two negative integers
   (d) no real numbers
   (e) only one negative integer

5. If $x = \frac{1}{2}$ is one of the solutions of the quadratic equation $2x^2 + x + k = 0$, then the other solution is

(a) -1
(b) 2
(c) -2
(d) 1
(e) 0

6. The graph of the function $f(x) = \begin{cases} |x| \ , & \text{if } x \leq 1 \ ; \\ 5 \ , & \text{if } x > 1 \ , \end{cases}$ is **increasing** on the interval

(a) $(-\infty, \infty)$
(b) $(0, \infty)$
(c) $(0, 1)$
(d) $(-\infty, 0)$
(e) $(1, \infty)$

7. The graph of the equation $|y| = (x-y)^2$ is

   (a) symmetric with respect to the y-axis only
   (b) symmetric with respect to the x-axis and y-axis
   (c) not symmetric with respect to the x-axis, y-axis and origin
   (d) symmetric with respect to the x-axis only
   (e) symmetric with respect to the origin only

8. If $f(x) = \begin{cases} 1 - \lfloor 2x \rfloor \ , & \text{if } x < -3 \ ; \\ \\ 16x^2 - 1 \ , & \text{if } x \geq -3 \ , \end{cases}$
   where $\lfloor x \rfloor$ **is the greatest integer function** of x , then $f(-\pi) =$

   (a) -6
   (b) -7
   (c) 7
   (d) 8
   (e) $16\pi^2 - 1$

9. If the line $ax + by + \frac{5}{2} = 0$ with the y-intercept $-\frac{5}{6}$ is parallel to the line $2x + 3y = 16$, then $a + b =$

(a) -10
(b) 5
(c) -5
(d) 10
(e) -8

10. Which one of the following does NOT define y as a function of x ?

(a) $|x| - y = 3$
(b) $x^2 - 1 = \sqrt{y}$
(c) $\{(2, 5), (3, 3), (4, 4), (5, 2)\}$
(d) $xy = 5$
(e) $4x = \sqrt{y^2}$

11. Let $M(x, y)$ be the **midpoint** of the line segment that joins the points $(3, 4)$ and $(k, 6)$. If $x + y = 1$, then the value of k is equal to

(a) -6
(b) 8
(c) -4
(d) -11
(e) 5

12. The solution set of the equation $\sqrt{3x+1} - \sqrt{x+1} = 2$ consists of

(a) two nonnegative integers
(b) only one negative integer
(c) only one positive integer
(d) two positive integers
(e) two negative integers

13. If $x = -\frac{5}{9}$ is the solution of the equation $\frac{2}{x} - 4 = 5 + \frac{k}{x}$, then $k =$

(a) -2
(b) 7
(c) 2
(d) -3
(e) 8

14. The solution set of the inequality $x + \frac{1}{x} \geq 0$ is

(a) $[-1, 0) \cup [1, \infty)$
(b) $(0, \infty)$
(c) $[0, \infty)$
(d) $[-1, 1]$
(e) $(-\infty, -1] \cup (0, 1]$

15. For $i = \sqrt{-1}$, the expression

$$\left(\sqrt[3]{-8}\right)\left(\sqrt{-9}\right) - \frac{1+i^7}{1+i} =$$

(a) $6+i$
(b) $-6+i$
(c) $-5i$
(d) $-7i$
(e) $-6-i$

16. If $x^2+y^2+2x+y-1=k$ represents an **equation of a circle**, then the value(s) of k is (are)

(a) $\left(-\infty, -\frac{9}{4}\right)$
(b) $-\frac{11}{4}$
(c) $\left(-\frac{9}{4}, \infty\right)$
(d) $(-\infty, -4)$
(e) $-\frac{9}{4}$

17. If $a < b$, then the **distance** between the points $(1, a)$ and $(1, 2b - a)$ is equal to

(a) $2(b - a)$
(b) $2(a + b)$
(c) $4(a - b)$
(d) $2(a - b)$
(e) $2b$

18. The **number** of the solution(s) for the equation $|x + 3|^2 + |x + 3| = 0$ is equal to

(a) 1
(b) 4
(c) 2
(d) 0
(e) 3

19. The solution set of the inequality $x^2 - 2x + 1 \leq 0$ is

(a) $\emptyset$
(b) $(-\infty, \infty)$
(c) $(-\infty, 1) \cup (1, \infty)$
(d) $\{1\}$
(e) $(-\infty, 1)$

20. The solution set of the inequality $4 - 2\left|x - \frac{1}{2}\right| < 5$ is

(a) $\emptyset$
(b) $[0, 1]$
(c) $\left(-\frac{1}{2}, \infty\right)$
(d) $(-\infty, \infty)$
(e) $\left(-\infty, \frac{1}{2}\right)$

King Fahd University of Petroleum and Minerals
Prep-Math Program

CODE004 **CODE004**

MATH 001
SECOND MAJOR
TERM 231
11 NOVEMBER 2023
Net Time Allowed: 100 minutes

Name			
ID		**Sec**	

Check that this exam has 20 questions

Important Instructions:

1. All types of calculators, smart watches, mobile phones, or any other electronic devices are NOT allowed during the examination.
2. Use HB 2.5 pencils only.
3. Use a good eraser. DO NOT use the erasers attached to the pencil.
4. Write your name, ID number and Section number on the examination paper and in the upper left corner of the answer sheet.
5. When bubbling your ID number and Section number, be sure that the bubbles match with the numbers that you write.
6. The Test Code Number is already bubbled in your answer sheet. Make sure that it is the same as that printed on your question paper.
7. When bubbling, make sure that the bubbled space is fully covered.
8. When erasing a bubble, make sure that you do not leave any trace of penciling.

1. Let $M(x, y)$ be the **midpoint** of the line segment that joins the points $(3, 4)$ and $(k, 6)$. If $x + y = 1$, then the value of k is equal to

   (a) -11
   (b) 8
   (c) 5
   (d) -4
   (e) -6

2. If $f(x) = \begin{cases} 1 - \lfloor 2x \rfloor \ , & \text{if } x < -3 \ ; \\ \\ 16x^2 - 1 \ , & \text{if } x \geq -3 \ , \end{cases}$
   where $\lfloor x \rfloor$ **is the greatest integer function** of x , then $f(-\pi) =$

   (a) 8
   (b) $16\pi^2 - 1$
   (c) -6
   (d) 7
   (e) -7

3. The solution set of the inequality $x + \frac{1}{x} \geq 0$ is

(a) $[-1, 1]$
(b) $(0, \infty)$
(c) $[-1, 0) \cup [1, \infty)$
(d) $(-\infty, -1] \cup (0, 1]$
(e) $[0, \infty)$

4. The graph of the equation $|y| = (x - y)^2$ is

(a) not symmetric with respect to the x-axis, y-axis and origin
(b) symmetric with respect to the origin only
(c) symmetric with respect to the y-axis only
(d) symmetric with respect to the x-axis and y-axis
(e) symmetric with respect to the x-axis only

5. The **sum** of all the real solution(s) of the equation $(x+1)^{\frac{2}{3}}+3=12$ is

(a) 27
(b) -4
(c) 3
(d) -9
(e) -2

6. If the line $ax+by+\frac{5}{2}=0$ with the y-intercept $-\frac{5}{6}$ is parallel to the line $2x+3y=16$, then $a+b=$

(a) 5
(b) 10
(c) -10
(d) -5
(e) -8

7. Which one of the following does NOT define y as a function of x ?

(a) $x^2 - 1 = \sqrt{y}$
(b) $xy = 5$
(c) $\{(2,5),(3,3),(4,4),(5,2)\}$
(d) $4x = \sqrt{y^2}$
(e) $|x| - y = 3$

8. The solution set of the equation $\sqrt{3x+1} - \sqrt{x+1} = 2$ consists of

(a) two positive integers
(b) only one positive integer
(c) two nonnegative integers
(d) two negative integers
(e) only one negative integer

9. The solution set of the inequality $x^2 - 2x + 1 \leq 0$ is

(a) $(-\infty, 1)$
(b) $\emptyset$
(c) $(-\infty, 1) \cup (1, \infty)$
(d) $(-\infty, \infty)$
(e) $\{1\}$

10. The solution set of the equation $\dfrac{x-1}{x^2-1} = \dfrac{1}{2}$ consists of

(a) only one negative integer
(b) two negative integers
(c) no real numbers
(d) one positive and one negative integers
(e) only one positive integer

11. If $f(x) = \dfrac{1}{x+1}$, then the difference quotient $\dfrac{f(1) - f(h+1)}{h} =$

(a) $\dfrac{h}{2h+2}$

(b) $\dfrac{-1}{2(h+2)}$

(c) $\dfrac{-1}{h+2}$

(d) $\dfrac{1}{2(h+2)}$

(e) $\dfrac{h}{h+2}$

12. A farmer has a rectangular garden plot surrounded by $30\ m$ of fence. If the area of the garden is $36\ m^2$, then the **dimensions** of the garden are

(a) $5\ m$ and $10\ m$

(b) $4\ m$ and $11\ m$

(c) $4\ m$ and $9\ m$

(d) $3\ m$ and $12\ m$

(e) $6\ m$ and $6\ m$

13. The solution set of the inequality $4 - 2\left|x - \frac{1}{2}\right| < 5$ is

(a) $\emptyset$
(b) $[0, 1]$
(c) $\left(-\infty, \frac{1}{2}\right)$
(d) $(-\infty, \infty)$
(e) $\left(-\frac{1}{2}, \infty\right)$

14. For $i = \sqrt{-1}$, the expression

$$\left(\sqrt[3]{-8}\right)\left(\sqrt{-9}\right) - \frac{1 + i^7}{1 + i} =$$

(a) $-5i$
(b) $-6 - i$
(c) $-7i$
(d) $-6 + i$
(e) $6 + i$

15. The **number** of the solution(s) for the equation $|x+3|^2 + |x+3| = 0$ is equal to

(a) 2
(b) 4
(c) 0
(d) 1
(e) 3

16. If $x = \frac{1}{2}$ is one of the solutions of the quadratic equation $2x^2 + x + k = 0$, then the other solution is

(a) 2
(b) 1
(c) -1
(d) -2
(e) 0

17. The graph of the function $f(x) = \begin{cases} |x| \ , & \text{if } x \leq 1 \ ; \\ \\ 5 \ , & \text{if } x > 1 \ , \end{cases}$ is **increasing** on the interval

(a) $(0, \infty)$
(b) $(1, \infty)$
(c) $(0, 1)$
(d) $(-\infty, \infty)$
(e) $(-\infty, 0)$

18. If $x = -\frac{5}{9}$ is the solution of the equation $\frac{2}{x} - 4 = 5 + \frac{k}{x}$, then $k =$

(a) 8
(b) -2
(c) 2
(d) -3
(e) 7

19. If $a < b$, then the **distance** between the points $(1, a)$ and $(1, 2b - a)$ is equal to

(a) $2(a - b)$
(b) $2b$
(c) $4(a - b)$
(d) $2(a + b)$
(e) $2(b - a)$

20. If $x^2 + y^2 + 2x + y - 1 = k$ represents an **equation of a circle**, then the value(s) of k is (are)

(a) $-\frac{9}{4}$
(b) $\left(-\infty, -\frac{9}{4}\right)$
(c) $(-\infty, -4)$
(d) $-\frac{11}{4}$
(e) $\left(-\frac{9}{4}, \infty\right)$

Q	MASTER	CODE01	CODE02	CODE03	CODE04
1	A	A 5	E 7	E 20	A 4
2	A	C 17	E 3	D 1	A 17
3	A	D 2	B 2	A 9	B 13
4	A	B 11	D 13	D 12	B 6
5	A	D 12	C 20	A 8	E 1
6	A	B 15	B 9	C 19	A 7
7	A	C 13	B 11	E 6	D 18
8	A	C 9	B 4	D 17	B 11
9	A	E 4	D 5	B 7	E 14
10	A	D 8	D 19	E 18	C 12
11	A	D 6	C 14	D 4	D 20
12	A	C 1	A 15	C 11	D 9
13	A	A 16	C 1	B 2	D 15
14	A	C 7	A 8	B 13	A 10
15	A	A 20	A 10	C 10	D 16
16	A	D 3	A 16	C 5	C 8
17	A	D 10	C 17	A 3	C 19
18	A	B 14	A 6	A 16	E 2
19	A	A 18	D 12	D 14	E 3
20	A	B 19	E 18	D 15	E 5

Answer Counts

V	A	B	C	D	E
1	4	4	5	6	1
2	5	4	4	4	3
3	4	3	4	6	3
4	4	3	3	5	5