1) Let $i = \sqrt{-1}$. If $(3 - i) - (3 - i)^2 = x + iy$, where x and y are real numbers, then $3x + y =$

A) 0

B) 2

C) 10

D) - 2

E) - 10

2) Let f be a linear function such that $f(-2) = \frac{1}{2}$ and $f(1) = \frac{3}{2}$, then $f(\frac{5}{2}) =$

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

B) - 2

C) 2

D) 0

E) $-\frac{2}{3}$

3) Which ONE of the following statements is TRUE

A) The slope of the line $3x - 2 = 0$ is $\frac{2}{3}$.

B) The line $3x + 2y = 6$ is parallel to the line $4y = -6x + 1$.

C) The line $3x + 2y = 6$ is perpendicular to the line $3y = -\frac{9}{2}x + 2$.

D) The slope of the line $x = \frac{3}{7}y - 5$ is $\frac{3}{7}$.

E) The slope of the line $2y = 6$ is 3.

4) The solution set, in interval notation, of the inequality
$-3|2x - 1| + 5 \geq -4$ is

A) $(-\infty, -1) \cup [2, \infty)$

B) $[-1, 4]$

C) $(-\infty, 2]$

D) $[-1, 2]$

E) $(-\infty, -1] \cup [4, \infty)$

5) The sum of all the solutions of the equation $3x(x - 1) = 6$ is equal to

A) -1

B) 1

C) -2

D) -6

E) 2

6) If $f(x) = 3x$ and $g(x) = x^3 - x$, then which ONE of the following statements is TRUE ?

A) $f \cdot g$ is an even function.

B) $f - g$ is an even function.

C) $\frac{f}{g}$ is an odd function.

D) $\frac{g}{f}$ is an odd function.

E) $f + g$ is an even function.

7) The sum of all the solutions of the equation $8x^3 - 27 = 0$ is equal to

A) $-\frac{3}{2}$

B) 3

C) -3

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

E) 0

8) If the line through the points $(1, 3)$ and $(-3, b)$ is perpendicular to the line $2x - 5y = 7$ then $b =$

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

B) -13

C) 13

D) $\frac{18}{5}$

E) 2

9) The graph of the function $f(x) = \begin{cases} 2x & \text{if } x \le -1 \\ x^2 - 1 & \text{if } x > -1 \end{cases}$ is increasing

A) on the interval $(0 , \infty)$

B) on the interval $(-\infty , \infty)$

C) on the interval $(-\infty , -1)$

D) on the interval $(-1 , 0)$

E) on the interval $(-\infty , -1)$ and on the interval $(0 , \infty)$

10) Let $[\![\ ]\!]$ denotes the greatest integer function.

If $f(x) = \begin{cases} x - 1 & \text{if } x \le -2 \\ [\![2x + 1]\!] & \text{if } -2 < x \le 4 \\ x^2 - 4x & \text{if } x > 4 \end{cases}$, then $(f \circ f)(\pi) =$

A) 7

B) 49

C) 28

D) 15

E) 21

11) If the quadratic equation $x^2 - kx + 3 = 0$ has exactly one solution then one value of k is

A) 3

B) 6

C) -3

D) $3\sqrt{2}$

E) $2\sqrt{3}$

12) Let $i = \sqrt{-1}$. If $z = \dfrac{1 + 3i}{1 - i}$ is written in standard form, then $z =$

A) $2 + i$

B) $2 - i$

C) $-1 - 2i$

D) $-1 + 2i$

E) $1 + 2i$

13) If the graph of $y = \dfrac{2 - x}{x + 3}$ is translated one unit down and two units to the left, then the equation of the new graph is

A) $y = -\dfrac{2x + 5}{x + 5}$

B) $y = \dfrac{x + 5}{x}$

C) $y = \dfrac{-x}{x + 5}$

D) $y = \dfrac{5}{x + 5}$

E) $y = \dfrac{4 - x}{x + 1}$

14) The domain of the function $f(x) = \dfrac{x - 2}{x^2 + 2x - 8}$ is

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

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

C) $(-4, 2) \cup (2, \infty)$

D) $(-\infty, -4) \cup (-4, 2)$

E) $(-\infty, -4) \cup (-4, 2) \cup (2, \infty)$

15) The solution set, in interval notation, of the inequality $-\frac{1}{3} \le \frac{2-x}{5} < \frac{1}{2}$ is

A) $[-3, 22]$

B) $(-\frac{1}{2}, \frac{2}{3}]$

C) $(-\frac{1}{2}, \frac{11}{3}]$

D) $(-22, 3]$

E) $(-\frac{9}{2}, \frac{11}{3}]$

16) If $f(x) = 2x - 1$ and $(f \circ g)(x) = 2x^2 - 4x + 1$, then $g(-1) =$

A) -3

B) 4

C) 7

D) 3

E) 0

17) If the point $(1, -3)$ lies on the graph of the function $y = f(x)$ then a point that lies on the graph of the function $y = 2f\left(\frac{x}{2}\right) + 1$ is

A) $\left(\frac{1}{2}, -\frac{1}{2}\right)$

B) $(2, -5)$

C) $\left(\frac{1}{2}, -5\right)$

D) $\left(2, -\frac{1}{2}\right)$

E) $(2, 7)$

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

A) $(-1, 4]$

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

C) $(-1, 2]$

D) $(-\infty, -1) \cup [2, \infty)$

E) $(-\infty, -1) \cup [4, \infty)$

19) The product of all the solutions of $\sqrt{3x + 1} + 1 = x + 2$, is equal to

A) 1

B) - 1

C) 2

D) 0

E) - 2

20) The sum of all the solutions of $\sqrt{(x - 1)^2} = |1 - x|^2 - 12$ is equal to

A) - 2

B) - 4

C) 4

D) 2

E) 0

Answer Key
Testname: MAJOR 2 MATH001 222 CODE 001

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