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2020

العام الدراسي 19

Academic Year

امتحان الفصل الدراسي الأول

End of Term 1 Exam

Student No /رقم الطّالب			
Student Name /اسم الطّالب			
School Name / اسم المدرسة			
Grade /الصف	Grade 10	Stream/المسار	Elite
Subject / المادة	Mathematics		

This table is to be filled by markers

يملأ هذا الجدول بدقّة تامّة من قبل لجنة التّقدير.

رقم السّؤال Question No.	الدّرجة Mark		المقدّر1 Marker 1	المقدّر2 Marker2	المراجع Reviser
	رقماً In Figures	كتابةً In Words			
Section I					
Section II					
الدّرجة المستحقّة Allotted Mark					

G10 | Math Elite-Eng | الرياضيات النسخة الإنجليزية

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Subject	Math	Grade	10	Stream	Elite	Term	First	Total No of Pages	13

MULTIPLE CHOICE: SECTION I
NO CALCULATOR IS ALLOWED FOR THIS PART OF THE EXAM.

1. Maryam needs to decorate at least 10 tables for an upcoming party. She can choose between blue flowers, which cost AED 53 per table, and red flowers, which cost AED 77 per table. Her budget for decoration is no more than AED 860. She must decorate at least 1 table with blue flowers and at least 4 tables with red flowers. Which of the following inequalities represents the conditions described if x is the number of tables decorated with blue flowers and y is the number of tables decorated with red flowers?

   (A) $53x + 77y \geq 860$
   $x + y \leq 10$
   $x \geq 1$
   $y \geq 4$

   (B) $53x + 77y \leq 860$
   $x + y \geq 10$
   $x \geq 1$
   $y \geq 4$

   (C) $53x + 77y \geq 860$
   $x + y \geq 10$
   $x \leq 1$
   $y \leq 4$

   (D) $53x + 77y \leq 860$
   $x + y \leq 10$
   $x \leq 1$
   $y \leq 4$

---

2. Which of the following correctly describes a possible solution set of a system of three linear equations in three variables?

   (A) three points

   (B) a line segment

   (C) a ray

   (D) a plane

$$\begin{bmatrix} 4x-3 & 3y \\ 7 & 13 \end{bmatrix} = \begin{bmatrix} 9 & -15 \\ 7 & 2z+1 \end{bmatrix}$$

3. Which of the numbers below is **NOT** a value of x, y, or z for the equation above?

(A) -6
(B) -5
(C) 3
(D) 6

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$$A = \begin{bmatrix} 6 & 4 & -8 & 5 \\ 1 & -3 & 9 & 7 \\ 0 & 2 & -2 & -4 \end{bmatrix} \quad B = \begin{bmatrix} 3 & 4 & 2 & 4 \\ 0 & -9 & -1 & 0 \\ -2 & -5 & 3 & -1 \end{bmatrix}$$

4. Matrices A and B are defined above. The matrix C is defined as $C = 2A - 3B$. If the matrix C exists, what is the value of c_{32}?

(A) 19
(B) 15
(C) -11
(D) Matrix C does not exist.

---

5. Find the area of the triangle with vertices $(-1, 2)$, $(1, -2)$, and $(2, 1)$.

(A) 10
(B) 5
(C) 4
(D) 2

6. Simplify $\dfrac{4^{4n}}{4^n+4^n+4^n+4^n}$.

(A) 1

(B) 4

(C) 4^n

(D) 4^{3n-1}

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7. The expression $\dfrac{7x-3}{x+4}$ is equivalent to which of the following?

(A) $7-\dfrac{3}{x+4}$

(B) $7-\dfrac{31}{x+4}$

(C) $-\dfrac{3}{4}$

(D) $\dfrac{7-3}{4}$

8. If $f(x)=5x^2-3$ and $f(x+a)=5x^2+30x+42$, what is the value of a?

(A) -30

(B) -3

(C) 3

(D) 30

9. Which of the polynomials below is **NOT** factorable over the real numbers?

(A) $x^2 + 4$

(B) $x^2 + 4x + 4$

(C) $x^3 + 8$

(D) $x^6 + 8$

---

10. Simplify $(x^4 - y^4) \div (x + y)$, for $x + y \neq 0$.

(A) $x^3 - y^3$

(B) $x^3 - x^2y + xy^2 - y^3$

(C) $x^3 + y^3$

(D) $x^3 + x^2y + xy^2 + y^3$

$$x^3 + ax^2 + bx + c = 0$$

11. In the equation above, a, b, and c are constants. If the roots of the equation are -4, -2, and 3, which of the following is a factor of $x^3 + ax^2 + bx + c$?

(A) $x - 2$

(B) $x - 4$

(C) $x + 4$

(D) $x + 3$

$$b^4 + 5b^2 - 36 = 0$$

12. What is the set of all solutions to the equation above?

(A) $\{-3, -2, 2, 3\}$
(B) $\{-3, 3, -2i, 2i\}$
(C) $\{-2, 2, -3i, 3i\}$
(D) $\{-3i, -2i, 2i, 3i\}$

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$$f = \{(3,5), (5,6), (6,10)\}, \quad g = \{(5,10), (6,3), (10,6)\}$$

13. Functions f and g are defined above. What is the value of $[f \circ g](5)$?

(A) 3
(B) 6
(C) 10
(D) undefined

I. $f(x) = \dfrac{3x+2}{5}, \quad g(x) = \dfrac{5x-2}{3}$
II. $f(x) = 3x - 7, \quad g(x) = \dfrac{1}{3}x - \dfrac{7}{16}$

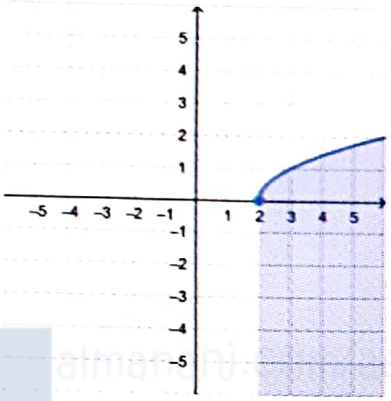
14. Which pair(s) of functions above are inverse functions?

(A) I only
(B) II only
(C) both I and II
(D) neither

$$y \leq \sqrt{x-2}$$

15. Which of the graphs below is the graph of the inequality above?

(A)



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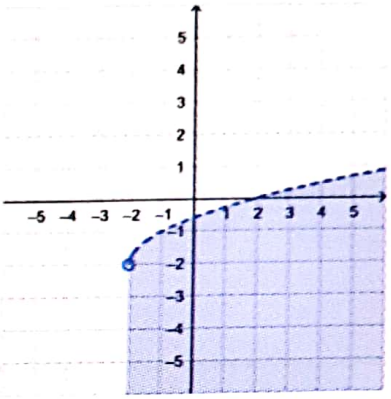

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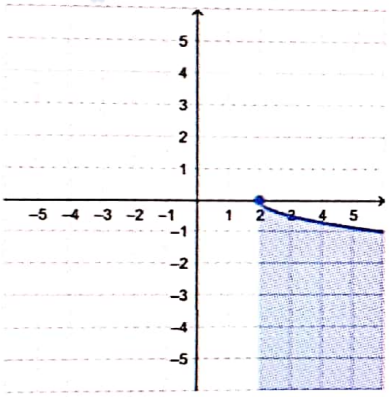
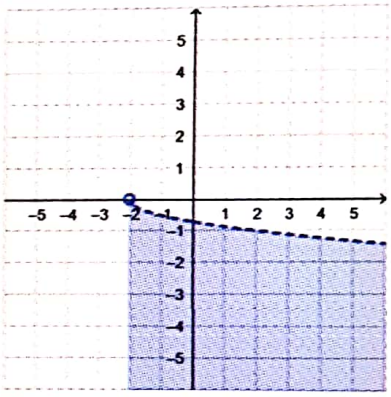


(D)



16. Simplify $\dfrac{\sqrt{6}}{\sqrt{3}-\sqrt{2}}$.

(A) $-3\sqrt{2}+2\sqrt{3}$

(B) $2\sqrt{2}+3\sqrt{3}$

(C) $3\sqrt{2}-2\sqrt{3}$

(D) $3\sqrt{2}+2\sqrt{3}$

$$\sqrt[4]{(-x)^4} = -x$$

17. When is the expression above true?

(A) Always, because fourth power and fourth root are inverse operations.
(B) Sometimes, because it is true when $x \leq 0$ and false when $x > 0$.
(C) Sometimes, because it is true when $x \geq 0$ and false when $x < 0$.
(D) Never, because an index of 4 always produces a positive principal root.

$$\frac{4\sqrt{x} - \sqrt{y}}{2\sqrt[4]{x} - \sqrt[4]{y}}$$

18. Simplify the expression above for $2\sqrt[4]{x} - \sqrt[4]{y} \neq 0$.

(A) $\sqrt[4]{x} + \sqrt[4]{y}$
(B) $2\sqrt{x} - \sqrt{y}$
(C) $2\sqrt{x} + \sqrt{y}$
(D) $2\sqrt[4]{x} + \sqrt[4]{y}$

$$\sqrt{x+2} = x$$

19. What is the set of all solutions to the equation above?

(A) $\{-1, 2\}$
(B) $\{-1\}$
(C) $\{2\}$
(D) There are no solutions.

END OF MULTIPLE CHOICE: SECTION I

GO ON TO THE NEXT PAGE FOR FREE RESPONSE: SECTION II

FREE RESPONSE: SECTION II

NO CALCULATOR IS ALLOWED FOR THESE QUESTIONS.
SHOW ALL YOUR WORK FOR FULL CREDIT.

$$A = \begin{bmatrix} 1 & 2 \\ -2 & -4 \end{bmatrix} \quad B = \begin{bmatrix} 1 & -2 \\ 3 & -4 \end{bmatrix} \quad C = \begin{bmatrix} 3 & -3 \\ -1 & 0 \\ 5 & -2 \end{bmatrix} \quad D = \begin{bmatrix} 3 & -1 & 2 \\ 0 & -4 & 5 \end{bmatrix}$$

20. Matrices A, B, C, and D are defined above.

(A) Determine if each of the matrices below has an inverse. If the inverse matrix exists, find it. If it does not exist, give a reason why.

(i) A

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(ii) B

(iii) C

(B) Use the matrices defined on the previous page to evaluate the following elements, if the matrix exists. If it does not exist, explain why.

(i) m_{12}, for $M = CD$

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(ii) n_{22}, for $N = AD + CB$

21. Questions (A) to (D) are independent.

$$5a^3 - 30a^2 + 40a + 2a^2b - 12ab + 16b$$

(A) Use grouping to completely factor the polynomial above.

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$$2\sqrt{48} - \sqrt{75} - \sqrt{12}$$

(B) Simplify the expression above. If it cannot be simplified, explain why.

$$\sqrt{5x-3}-\sqrt{x-2}=0$$

(C) Solve the equation above.

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$$5-\sqrt{2x+4}>1$$

(D) Solve the inequality above.

$$f(x) = x^3 - 2x^2 - 2x + 4$$
$$g(x) = \frac{1}{4}x - 3$$
$$h(x) = (f - g^{-1})(x)$$

22. For functions $f(x)$, $g(x)$, and $h(x)$ defined above, answer the questions below.

(A) Find all the zeros of $f(x)$ and describe its end behavior.

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(B) Find $g^{-1}(x)$.

(C) Express $h(x)$ in terms of x.

(D) Evaluate $h(4)$.

(E) Show that $(x-4)$ is a factor of $h(x)$, then find all the zeros of $h(x)$.

END OF FREE RESPONSE: SECTION II

END OF EXAM