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The completion of the basic education certificate
Examination 2015 for our sons abroad

Algebra & Statistics

Second Term

Time : 2 hours

(الأسئلة في صفتين)

(الفصل الدراسي الثاني ٢٠١٥) الجبر والإحصاء بالإنجليزية للصف الثالث الإعدادي

(يسمح باستخدام الآلة الحاسبة)

(يسلم الطالب ورقة امتحانية باللغة العربية مع الورقة المترجمة)

Answer the following questionsFirst question:choose the correct answer from the given answers:(1) The solution set of the equation $x^2 + 9 = 0$ is

a) $\{3, -3\}$.

b) $\{-9\}$.

c) \emptyset .

d) $\{(3, -3)\}$

(2) If $P(A) = 0.75$ then $P(A^c) = \dots\dots\dots$

a) 1

b) 0.75

c) 0.5

d) 0.25

(3) If $n(x) = \frac{1}{x} - \frac{3}{x}$ where $x \neq 0$ then $n^{-1}(x)$ is

a) $\frac{-2}{x}$

b) $\frac{x}{2}$

c) $\frac{2}{x}$

d) $\frac{-x}{2}$

(4) If A and B are two mutually exclusive events. Then $P(A \cap B) = \dots\dots\dots$

a) 1

b) zero

c) $P(A)$

d) $P(B)$

(5) If $x = 1, y^2 = x + 3$ then $y = \dots\dots\dots$

a) 4

b) 2

c) -2

d) ± 2

(6) The set of zeroes of the function $f(x) = x(x^2 - 1)$ is

a) $\{0\}$

b) $\{0, -1, 1\}$

c) $\{-1, 1\}$

d) R

Second question:

(a) By using the formula find the solution set of the equation

$$x^2 - 2x - 2 = 0 \quad (\text{where } \sqrt{3} \approx 1.73)$$

(b) Find $n(x)$ in the simplest form and showing the domain of n where

$$n(x) = \frac{x^2 + 3x}{x^2 - 4} \times \frac{x - 2}{2x + 6}$$

(بقية الأسئلة في الصفحة الثانية)

Third question:

(a) Find the solution set for the two equations together

$$x - y = 0, \quad x^2 + y^2 = 18$$

(b) If A and B are two events of the sample space of a random experiment and

$$P(A) = 0.3 \quad P(B) = 0.6 \quad P(A \cap B) = 0.2$$

Find: (1) $P(A')$ (2) $P(A \cup B)$ **Fourth question:**(a) Find $n(x)$ in the simplest form showing the domain of n where

$$n(x) = \frac{5x - 25}{x^2 - 25} + \frac{x^2 + 5x}{(x + 5)^2}$$

(b) Find the solution set for the two simultaneous equations together

$$2x - y = 3, \quad 3x - y = 4$$

Fifth question:(a) Prove that $n_1 = n_2$ where

$$n_1(x) = \frac{x^2 + 4}{x^2 + 4x}, \quad n_2(x) = \frac{3x^2 + 4}{3x^2 + 4x}$$

(b) Graph of the function $f: f(x) = x^2 - 1$ take $x \in [-3, 3]$ and from thegraph find the solution set of the equation: $x^2 - 1 = 0$

Minimum = 1

equation = 0

(انتهت الأسئلة)

3.3 = 3.3

Algebra 2015

- 2nd term -

Q.1 Choose

- | | |
|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| <p>① c \emptyset</p> <p>② d 0.25</p> <p>③ d $\frac{-x}{2}$</p> | <p>④ b Zero</p> <p>⑤ d ± 2</p> <p>⑥ b $\{0, -1, 1\}$</p> |
|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|

Q.2 (a) $x^2 - 2x - 2 = 0$, $\sqrt{3} \approx 1.73$

$a = 1$, $b = -2$, $c = -2$

$$\therefore x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{2 \pm \sqrt{4 + 4 \times 1 \times 2}}{2 \times 1} = \frac{2 \pm \sqrt{12}}{2}$$

$$x = \frac{2 \pm 2\sqrt{3}}{2} \begin{cases} \frac{2 + 2\sqrt{3}}{2} = 2.73 \\ \frac{2 - 2\sqrt{3}}{2} = -0.73 \end{cases}$$

$\therefore S.S = \{2.73, -0.73\}^2$

(b)

$$\begin{aligned} n(x) &= \frac{x^2 + 3x}{x^2 - 4} \times \frac{x - 2}{2x + 6} \\ &= \frac{x(x+3)}{\cancel{(x-2)}(x+2)} \times \frac{\cancel{(x-2)}}{2(x+3)} \end{aligned}$$

domain = $\mathbb{R} - \{2, -2, -3\}$, after reduction

$$\therefore n(x) = \frac{x}{x+2} \times \frac{1}{2}$$

$$\therefore \boxed{n(x) = \frac{x}{2(x+2)}}$$

(13)

$$\boxed{\text{Q.3}} \quad \textcircled{a} \quad X - Y = 0 \quad \textcircled{1}$$

$$X^2 + Y^2 = 18 \quad \textcircled{2}$$

From $\textcircled{1}$ $\boxed{X=Y}$, substitute in $\textcircled{2}$

$$\therefore Y^2 + Y^2 = 18 \quad \therefore 2Y^2 = 18 \quad (\div 2)$$

$$\therefore Y^2 = 9$$

$$\therefore Y = 3, \quad Y = -3$$

$$\therefore X = Y \quad \left\{ \begin{array}{l} X = Y \\ \therefore X = -3 \end{array} \right.$$

$$\therefore X = 3 \quad \left\{ \begin{array}{l} X = Y \\ \therefore X = -3 \end{array} \right.$$

$$\therefore S - S = \underline{\underline{\{(3, 3), (-3, -3)\}}}$$

$$\textcircled{b} \quad P(A) = 0.3, \quad P(B) = 0.6$$

$$P(A \cap B) = 0.2$$

$$\textcircled{c} \quad P(A') = 1 - P(A)$$

$$= 1 - 0.3$$

$$= 0.7$$

$$\textcircled{d} \quad P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= 0.3 + 0.6 - 0.2$$

$$= 0.7$$

$\textcircled{14}$

Q.4 @

$$n(x) = \frac{5x-25}{x^2-25} + \frac{x^2+5x}{(x+5)^2}$$

$$\therefore n(x) = \frac{5(\cancel{x-5})}{(\cancel{x-5})(x+5)} + \frac{x(\cancel{x+5})}{(x+5)^2}$$

$$\therefore \text{domain} = \mathbb{R} - \{5, -5\}$$

$$\therefore n(x) = \frac{5}{x+5} + \frac{x}{x+5} = \frac{x+5}{x+5}$$

$$\therefore \boxed{n(x) = 1}$$

$$\begin{aligned} \textcircled{b} \quad 2x - y &= 3 & \textcircled{1} \\ 3x - y &= 4 & \textcircled{2} \end{aligned}$$

by subtracting $\textcircled{1}$ from $\textcircled{2}$

$$\begin{aligned} \therefore \quad & 3x - y = 4 \\ \ominus \quad & 2x - y = 3 \\ \hline & x = 1 \end{aligned}$$

$$\therefore x = 1 \quad \boxed{x = 1}$$

by substituting in $\textcircled{1}$

$$\begin{aligned} \therefore 2(1) - y &= 3 \\ 2 - y &= 3 \\ 2 - 3 &= y \end{aligned}$$

$$\therefore \boxed{y = -1}$$

$$\therefore \text{S.S} = \{(1, -1)\}$$

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Q.5

(a)

$$n_1(x) = \frac{x^2 + 4}{x^3 + 4x}$$

$$n_1(x) = \frac{x^2 + 4}{x(x^2 + 4)}$$

domain = $\mathbb{R} - \{0\}$

$$n_1(x) = \frac{1}{x}$$

$$n_2(x) = \frac{3x^2 + 4}{3x^3 + 4x}$$

$$n_2(x) = \frac{3x^2 + 4}{x(3x^2 + 4)}$$

domain = $\mathbb{R} - \{0\}$

$$n_2(x) = \frac{1}{x}$$

\therefore domain of n_1 = domain of n_2

$$n_1(x) = n_2(x)$$

$$\therefore n_1 = n_2$$

(b) $f(x) = x^2 - 1, x \in [-3, 3]$

x	-3	-2	-1	0	1	2	3
f(x)	8	3	0	-1	0	3	8

vertex point (0, -1)

Min value = -1

eqn. of axis of symmetry is: $x = 0$

From the graph

the S.S = $\{1, -1\}$

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