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Algebra, statistics

(الفصل الدراسي الثاني ٢٠١٦)

(Second Term)

الصف الثالث الاعدادي

Time : 2 hours

مادة : الجبر والإحصاء بالإنجليزية

يسمح باستخدام الآلة الحاسبة

تنبيه هام : (يسلم الطالب ورقة امتحانية باللغة العربية مع الورقة المترجمة)

Answer the following questions:

Calculator is allowed

First question: Choose the correct answer of the following:

- (1) The solution set of the equation $9 - x^2 = 0$ is
(a) 3 (b) -3 (c) $\{3, -3\}$ (d) \emptyset
- (2) If $P(a) = P(a')$ then $P(a) = \dots\dots\dots$
(a) 1 (b) $\frac{1}{2}$ (c) 0.25 (d) zero
- (3) If $n(x) = \frac{3}{x} + \frac{1}{x}$ then $n^{-1}(x) = \dots\dots\dots$
(a) $\frac{-4}{x}$ (b) $\frac{4}{x}$ (c) $\frac{x}{4}$ (d) $\frac{-x}{4}$
- (4) If a, b are two mutual exclusive events then $P(a \cup b) = \dots\dots\dots$
(a) $P(a)$ (b) $P(\bar{a})$ (c) $P(a) + P(b)$ (d) $P(b)$
- (5) If $x = 3$ & $y^2 = x + 6$ then $y = \dots\dots\dots$
(a) 10 (b) 3 (c) -3 (d) ± 3
- (6) The set of zeros of the function $f(x) = x(x + 1)$ is
(a) $\{-1, 0\}$ (b) $\{\text{Zero}\}$ (c) $(-1, 0)$ (d) $\{-1\}$

Second question:

- a) Using the formula to solve the equation $x^2 = 3x - 1$ in R where $\sqrt{5} = 2.226$
- b) Find $n(x)$ in the simplest form and showing the domain of n. Where $n(x) = \frac{x-3}{x^2-9} \times \frac{x^2+2x}{3x^2+6x}$

Third question:

- a) Find the solution set for the two equations together $x - 2y = 0$, $x^2 + y^2 = 20$
- b) If a and b are two events in a sample space of a random experiment and $P(a) = 0.6$, $P(b) = 0.7$, $P(a \cap b) = 0.5$. Find $P(\bar{a})$, $P(a \cup b)$.

Fourth question:

- a) Find $n(x)$ in the simplest form and showing the domain of n where :

$$n(x) = \frac{4x-16}{x^2-16} + \frac{x^2+x}{x^2+5x+4}$$

- b) Find the solution set for the two equations $3x + y = 5$, $x - y = -1$.

Fifth question:

- a) Prove that $n_1 = n_2$ where $n_1(x) = \frac{x^2+3}{x^3+3x}$, $n_2(x) = \frac{2x^2+3}{2x^3+3x}$.
- b) Draw the graph of the function $f(x) = x^2 - 2$. Taking that $x \in [-1, 3]$. From the graph find the solution set for the equation: $x^2 - 2x = 0$

(انتهت الأسئلة)

Algebra 2016

- 2nd term -

Q.1 Choose:
 (1) (c) $\{3, -3\}$ (4) (c) $P(a) + P(b)$
 (2) (b) $\frac{1}{2}$ (5) (d) ± 3
 (3) (c) $\frac{x^2}{4}$ (6) (a) $\{-1, 0\}$

Q.2 (a) $x^2 = 3x - 1 \quad \therefore x^2 - 3x + 1 = 0$

$\therefore a = 1, b = -3, c = 1, \sqrt{5} = 2.226$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{3 \pm \sqrt{9 - 4 \times 1 \times 1}}{2 \times 1} = \frac{3 \pm \sqrt{5}}{2}$$

$$x < \frac{3 + \sqrt{5}}{2} = 2.613$$

$$\frac{3 - \sqrt{5}}{2} = 0.387$$

$$\therefore S.S = \{2.613, 0.387\}$$

(b) $n(x) = \frac{x-3}{x^2-9} \times \frac{x^2+2x}{3x^2+6x}$

$$\therefore n(x) = \frac{x-3}{(\cancel{x-3})(x+3)} \times \frac{x(\cancel{x+2})}{3x(\cancel{x+2})}$$

$\therefore \text{domain} = \mathbb{R} - \{3, -3, 0, -2\}$
 after reduction:

$$\therefore n(x) = \frac{1}{x+3} \times \frac{1}{3} = \frac{1}{3(x+3)}$$

$$\therefore n(x) = \frac{1}{3(x+3)}$$

(9)

Q.3

$$\textcircled{a} \quad \begin{aligned} x - 2y &= 0 & \textcircled{1} \\ x^2 + y^2 &= 20 & \textcircled{2} \end{aligned}$$

From $\textcircled{1}$ $\boxed{x = 2y}$, substitute in $\textcircled{2}$

$$\therefore (2y)^2 + y^2 = 20$$

$$4y^2 + y^2 = 20$$

$$5y^2 = 20 \quad (\div 5)$$

$$\therefore y^2 = 4 \quad \therefore y = 2, y = -2$$

$$\begin{aligned} x &= 2y \\ x &= 2(2) \\ x &= 4 \end{aligned}$$

$$\begin{cases} x = 2y \\ x = 2(-2) \\ x = -4 \end{cases}$$

$$\therefore S - S = \{(4, 2), (-4, -2)\}$$

$$\textcircled{b} \quad P(a) = 0.6, P(b) = 0.7$$

$$P(a \cap b) = 0.5$$

$$P(a') = 1 - P(a) = 1 - 0.6$$

$$\therefore P(a') = 0.4$$

$$P(a \cup b) = P(a) + P(b) - P(a \cap b)$$

$$= 0.6 + 0.7 - 0.5$$

$$= 0.8$$

$\textcircled{10}$

Q.4

$$(a) \quad n(x) = \frac{4x-16}{x^2-16} + \frac{x^2+x}{x^2+5x+4}$$

$$\therefore n(x) = \frac{4(x-4)}{(x-4)(x+4)} + \frac{x(x+1)}{(x+4)(x+1)}$$

$$\text{domain} = \mathbb{R} - \{4, -4, -1\}$$

$$\therefore n(x) = \frac{4}{x+4} + \frac{x}{x+4} = \frac{x+4}{x+4}$$

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

$$(b) \quad 3x + y = 5 \quad (1)$$

$$x - y = -1 \quad (2)$$

by adding (1) + (2)

$$\therefore 4x = 4$$

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

substitute in (1)

$$\therefore 3 + y = 5$$

$$\therefore \boxed{y = 2}$$

$$\therefore \text{S.S} = \{(1, 2)\}$$

(11)

Q.5

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

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

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

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

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

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

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

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

\therefore domain of $n_1(x)$ = domain of $n_2(x)$

$n_1(x) = n_2(x)$

$\therefore n_1 = n_2$

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

x	-1	0	1	2	3
f(x)	-1	-2	-1	2	7

Find $f(-2) = (-2)^2 - 2$
 $= 2$

vertex point (0, -2)

Min value = -2

eqn. is $x = 0$

From the graph:

S.S. = $\{\sqrt{2}, -\sqrt{2}\}$

$\approx \{1.4, -1.4\}$

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