Key Form A

Birzeit University
Mathematics Department
Math234-Section (1)
Quiz#4

Instructor: Dr. Ala Talahmeh
Time: 10 minutes
Name:.....

First Semester 2022/2023
Date: 11/1/2023
Number:.....

2x1.5

Exercise#1 [3 marks]. Circle the correct answer.

(1) One of the following is a subspace of $\mathbb{R}^3$

(a) $S = \{(x, y, 2x - 3y) : x, y \in \mathbb{R}\}$
(b) $S = \{(x, y, xy) : x, y \in \mathbb{R}\}$
(c) $S = \{(1, y, z) : y, z \in \mathbb{R}\}$
(d) $S = \{(x - y, y, 2) : x, y \in \mathbb{R}\}$

(2) The set of vectors $\{(1, \alpha)^T, (\beta, 1)^T\}$ is a spanning set for $\mathbb{R}^2$ if

(a) $\alpha \neq 1$ and $\beta \neq 1$
(b) $\alpha\beta \neq 1$
(c) $\alpha\beta = 1$
(d) $\alpha \neq \beta$

2x1.5

Exercise#2 [3 marks]. Answer the following statements as **True** or **False**.

1. (.....T.....) The set of vectors $\{1, x, x^2, x^2 + x - 1\}$ is a spanning set of P_3.
2. (.....T.....) Span$\{1 + x, 1 - x\}$ is a subspace of P_2

Exercise#3 [4 marks]. Let A be a matrix in $\mathbb{R}^{2\times 2}$, and let

$$W = \left\{B \in \mathbb{R}^{2\times 2} : AB = O\right\}.$$

Show that W is a subspace of $\mathbb{R}^{2\times 2}$.

(1) (i) $AO = O \Rightarrow O_{2\times 2} \in W$, that is, $W \neq \phi$.

(ii) Let B and C in W, that is, $AB = O$ and $AC = O$.

(1.5) then $A(B+C) = AB + AC = O + O = O$.

$\therefore B + C \in W$.

(1.5) (iii) Let $\alpha \in \mathbb{R}$ and $B \in W$. Then $A(\alpha B) = \alpha(AB) = \alpha O = O$

$\therefore \alpha B \in W$.

Good Luck

Key Form B

Birzeit University
Mathematics Department
Math234-Section (1)
Quiz#4

Instructor: Dr. Ala Talahmeh
Time: 10 minutes
Name:.....

First Semester 2022/2023
Date: 11/1/2023
Number:.....

Exercise#1 [3 marks]. Circle the correct answer. 2X1.5

(1) One of the following is not a subspace of $\mathbb{R}^3$

(a) $S = \{(x, y, 2x - 3y) : x, y \in \mathbb{R}\}$
(b) $S = \{(x, y, xy) : x, y \in \mathbb{R}\}$
(c) $S = \{(0, y, z) : y, z \in \mathbb{R}\}$
(d) $S = \{(x - y, y, 0) : x, y \in \mathbb{R}\}$

(2) The set of vectors $\{(0, \alpha)^T, (\beta, 0)^T\}$ is a spanning set for $\mathbb{R}^2$ if

(a) $\alpha \neq 1$ and $\beta \neq 1$
(b) $\alpha\beta \neq 1$
(c) $\alpha\beta \neq 0$
(d) $\alpha \neq \beta$

Exercise#2 [3 marks]. Answer the following statements as True or False. 2X1.5

1. (.....F.....) The set of vectors $\{1, x, x^2\}$ is a spanning set of P_4.
2. (.....T.....) Span$\{1 + x, 1 - x\}$ is a subspace of P_2

Exercise#3 [4 marks]. Let A be a matrix in $\mathbb{R}^{2\times 2}$, and let

$$W = \left\{B \in \mathbb{R}^{2\times 2} : AB = O\right\}.$$

Show that W is a subspace of $\mathbb{R}^{2\times 2}$.

see Form A.

Good Luck

Key Form A

Birzeit University
Mathematics Department
Math234-Section (5)
Quiz#4

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Time: 10 minutes
Name:.....

First Semester 2022/2023
Date: 11/1/2023
Number:.....

2x1.5

Exercise#1 [3 marks]. Circle the correct answer.

(1) One of the following is not a subspace of P_4

(a) $\{f(x) \in P_4 : f'(x) = 0\}$
(b) $\{f(x) \in P_4 : f(1) = 1\}$
(c) $\{f(x) \in P_4 : f(1) = 0\}$
(d) $\{f(x) \in P_4 : f(x) = ax^3 + bx^2,\ a, b \in \mathbb{R}\}$

(2) The set of vectors $\{(\alpha, \beta)^T, (1, -1)^T\}$ is a spanning set for $\mathbb{R}^2$ if

(a) $\alpha \neq 1$ and $\beta \neq 1$
(b) $\alpha\beta \neq 1$
(c) $\alpha \neq -\beta$
(d) $\alpha \neq \beta$

2x1.5

Exercise#2 [3 marks]. Answer the following statements as True or False.

1. (.....T.....) The set of vectors $\{1, x, x^2, x^2 + x - 1\}$ is not a spanning set of P_4.
2. (.....F.....) Let A be an $m \times n$ matrix. If $N(A) \neq \{0\}$ and $Ax = b$ is consistent, then the linear system $Ax = b$ has a unique solution.

Exercise#3 [4 marks]. Let

$$W = \Big\{p(x) \in P_3 : p''(x) + 2p'(x) = 0\Big\}.$$

Show that W is a subspace of P_3.

(i) Let $p(x) = 0$. Then

(1) $p''(x) + 2p'(x) = 0 + 2(0) = 0 \Rightarrow p(x) = 0 \in W \Rightarrow W \neq \emptyset$.

(ii) Let $p(x), q(x) \in W$, that is, $p''(x) + 2p'(x) = 0$ and $q''(x) + 2q'(x) = 0$

(1.5) Then $(p+q)''(x) + 2(p+q)'(x) = (p''(x) + 2p'(x)) + q''(x) + 2q'(x) = 0 + 0 = 0$

$\therefore p + q \in W$.

(1.5) (iii) Let $\alpha \in \mathbb{R}$ and $p(x) \in W$ then $(\alpha p)''(x) + 2(\alpha p)'(x)$

$= \alpha(p''(x) + 2p'(x)) = \alpha \cdot 0 = 0$.

$\therefore \alpha p \in W$.

Good Luck

Key Form B

Birzeit University
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Time: 10 minutes
Name:.....

First Semester 2022/2023
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2x1.5

Exercise#1 [3 marks]. Circle the correct answer.

(1) One of the following is a subspace of P_4

(a) $\{f(x) \in P_4 : f(0) = 1\}$
(b) $\{f(x) \in P_4 : f(1) = 1\}$
(c) $\{f(x) \in P_4 : f(1) = 0\}$
(d) $\{f(x) \in P_4 : f(x) = x^3 + bx^2,\ b \in \mathbb{R}\}$

(2) The set of vectors $\{(\alpha, \beta)^T, (1,1)^T\}$ is a spanning set for $\mathbb{R}^2$ if

(a) $\alpha \neq 1$ and $\beta \neq 1$
(b) $\alpha\beta \neq 1$
(c) $\alpha\beta = 1$
(d) $\alpha \neq \beta$

2x1.5

Exercise#2 [3 marks]. Answer the following statements as True or False.

1. (.....F.....) The set of vectors $\{1, x, x^2, x^2 + x - 1\}$ is a spanning set of P_4.

2. (.....T.....) Let A be an $m \times n$ matrix. If $N(A) = \{0\}$ and $Ax = b$ is consistent, then the linear system $Ax = b$ has a unique solution.

Exercise#3 [4 marks]. Let

$$W = \Big\{p(x) \in P_3 : p''(x) + 2p'(x) = 0\Big\}.$$

Show that W is a subspace of P_3.

See Form A.

Good Luck