Question 1 **2 / 2 points**

Let

$$\mathbb{M}_{2,2}(\mathbb{R})$$

be the vector space of all 2x2 matrices, and let *X* be a subspace of

$$\mathbb{M}_{2,2}(\mathbb{R})$$

such that

$$X \neq \{0\} \quad \text{and} \quad X \neq \mathbb{M}_{2,2}(\mathbb{R})\ .$$

Two of the following five statements are true. Which ones ?

1. *X* contains a basis for

$$\mathbb{M}_{2,2}(\mathbb{R})$$

2. $$1 \leq \dim X \leq 3$$

3. *X* can be spanned by 4 matrices;
4. *X* contains 4 linearly independent matrices;
5. For any three matrices u, v and w in X, $au + bv + cw = 0$ implies $a=b=c=0$.

- a) 3 and 5
- b) 1 and 4
- c) 1 and 5
- ✔ d) 2 and 3
- e) 2 and 4
- f) 1 and 2

View Feedback

Question 2 **2 / 2 points**

Let $W = \left\{ \left(x,\ y,\ z \right) \in \mathbb{R}^3 | x = -y \; and \; y = z \right\}$. Which of the following statements are true? Select all that apply.

- ✔ ☑ W is closed under addition.
- ✔ ☑ The zero vector belongs to W.
- ✔ ☑ W is closed under scalar multiplication.

▷ View Feedback

Question 3 **2 / 2 points**

Which of the following set S is a basis for the indicated vector space V?

○

$$S = \{1 + x^2, 1 + x, x^2 - x\} \text{ with } V = \mathbb{P}_2(\mathbb{R})$$

(the space of all polynomials of degree at most 2)

○

$$S = \{x, x^2, 1\} \text{ with } V = F(\mathbb{R})$$

(the space of all real-valued functions)

✔ ◉ S = {(1, -1, 0), (0, 2, 1), (0, 0, 1)} with $V = \mathbb{R}^3$

○

$$S = \left\{ \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}, \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix} \right\} \text{ with } V = M_{2,2}(\mathbb{R})$$

(the space of all 2x2 matrices)

▷ View Feedback

Question 4 **1 / 1 point**

True or False? The set

$$\{v_1, v_2, v_3\}$$

is linearly independent in a vector space V if one of the vectors in that set is a linear combination of the other two.

- ○ True
- ✓ ◉ False

▷ View Feedback

Question 5 **1 / 1 point**

Let *F*(**R**) be the space of real-valued functions. Let S be the following set of functions:

$$S = \{x, x + \sin x, 3\sin x\}.$$

Which of the following statement is true for S?

- ✓ ◉ S is linearly dependent
- ○ S is linearly independent
- ○ S={0}, where 0 is the zero function.
- ○ S spans *F*(**R**)

▷ View Feedback

Question 6 **1 / 1 point**

Let U be a subspace of $\mathbb{R}^{16}$. Suppose U has a subset of 13 linearly independent vectors and another subset of 10 linearly dependent vectors. Which of the following statements is always true for such a subspace U?

- ○ U has a spanning set with 13 vectors.
- ○ $$10 \leq \dim U \leq 16$$
- ○ $$0 \leq \dim U \leq 13$$
- ○ $$10 \leq \dim U \leq 13$$
- ✓ ◉ $$13 \leq \dim U \leq 16$$
- ○ U has a spanning set with 10 vectors.

▷ View Feedback

Question 7 **2 / 2 points**

Let H be the following subspace of

$$\mathbb{P}_3(\mathbb{R})$$

, the vector space of all polynomials of degree at most 3.

$$H = \text{span}\{1, 1 - x^2\}$$

A basis for H is

$$\{1, 1 - x^2\}.$$

Which of the following extends this basis of H into a basis of

$$\mathbb{P}_3(\mathbb{R})?$$

- ○ $$\{1 + x, x\}$$
- ○ $$\{0, x, x^3\}$$
  where 0 is the zero polynomial
- ○ $$\{x^2, x^3\}$$
- ✔ ◉ $$\{-x + x^3, x^3\}$$

▷ View Feedback

Question 8 **1 / 1 point**

Which of the following polynomials belong to

$$\text{span}\ \{1 + x,\ 1 - x + x^2\}$$

? Select all that apply.

- ✔ ☑ $$x^2 - 2x$$
- ✔ ☐ 2
- ✔ ☑ $$2 + x^2$$
- ✔ ☐ $$x^2$$

▷ View Feedback

Question 9 **2 / 2 points**

Let

$$\mathbb{P}_2(\mathbb{R})$$

be the space of all polynomials with a degree of at most 2. Consider the set

$$S = \{x^2 - 1,\, x^2 - 2x,\, x + 1,\, x - 1\}\,.$$

Which of the following are true?

I. S is linearly dependent.
II. S is linearly independent
III. S spans

$$\mathbb{P}_2(\mathbb{R})$$

IV. S is a basis for

$$\mathbb{P}_2(\mathbb{R})$$

- a) II and IV
- b) I , II and IV
- ✔ c) I and III
- d) II and IV
- e) II and III
- f) I and II

View Feedback

Question 10 **1.667 / 2 points**

Which of the following are subspaces of

$$F(R) = \{f \mid f : R \to R\}$$

, where

$$F(R)$$

is the set of all real-valued functions? Select all that apply.

- [ ] $\{f \in F(R) \mid f(-x) + 3f(x) = 0\}$
- [ ] $\{f \in F(R) \mid f(-1)f(1) = 0\}$
- [x] $\{f \in F(R) \mid f(-2) = 0\}$
- [ ] $\{f \in F(R) \mid 2f(x) - f(-x) = 1\}$
- [ ] $\{f \in F(R) \mid f(5) = -1\}$
- [ ] $\{f \in F(R) \mid f(5) \leq 0\}$

Hide Feedback

The subspace test: a subset of a vector space is a subspace if and only if it contains the zero vector, is closed under scalar multiplication, and is closed under addition.

This set contains zero, and is closed under addition and scalar multiplication. Therefore it is a subspace by the subspace test.

Question 11 **2 / 2 points**

Let

$$\mathbb{M}_{2,2}(\mathbb{R})$$

be the vector space of all 2 x 2 matrices with real coefficients. Which of the following are subspaces of

$$\mathbb{M}_{2,2}(\mathbb{R})?$$

Select all that apply.

- [ ] $$\left\{\begin{bmatrix} a & b \\ c & d \end{bmatrix} \middle|\, ac = 0, a, b, c, d \in \mathbb{R}\right\}$$
- [ ] $$\left\{\begin{bmatrix} a & b \\ c & d \end{bmatrix} \middle|\, c + d = 2, a, b, c, d \in \mathbb{R}\right\}$$
- [ ] $$\left\{\begin{bmatrix} a & b \\ 0 & b \end{bmatrix} \middle|\, a^2 = b, a, b \in \mathbb{R}\right\}$$
- [x] $$\left\{\begin{bmatrix} a & b \\ 0 & b \end{bmatrix} \middle|\, a - b = 0, a, b \in \mathbb{R}\right\}$$
- [x] $$\left\{\begin{bmatrix} a & b \\ 0 & c \end{bmatrix} \middle|\, a - c = 0, a, b, c \in \mathbb{R}\right\}$$
- [ ] $$\left\{\begin{bmatrix} a & b \\ c & d \end{bmatrix} \middle|\, ab = 1, a, b, c, d \in \mathbb{R}\right\}$$

▷ View Feedback

Question 12 **2 / 2 points**

Which of the following is a basis for the subspace of

$$\mathbb{R}^3$$

defined by G={(x,y,z)| x-2y+z=0 } ?

- ○ a) {(-2,0,2),(-1,0,1)}
- ○ b) {(-2,0,2),(1,0,1)}
- ● c) {(2,1,0),(-1,0,1)}
- ○ d) {(-2,0,2)}
- ○ e) {(2,1,0)}
- ○ f) {(1,0,0),(0,1,0),(0,0,1)}

▷ View Feedback