

# Math 54 Quiz 3

September 12, 2019

## Question 1 (3 points)

*Directions:* For each item, circle either True or False. (0.5 points each)

- (True/False) There exist a set of 2019 vectors total that altogether span  $\mathbb{R}^3$ .
- (True/False) The three vectors  $(1, 2, 1, 3, 4)$ ,  $(1, 2, 0, 0, 1)$ ,  $(-1, 2, 1, -1, -1)$  form a basis for  $\mathbb{R}^5$ .
- (True/False) Three linearly independent vectors in  $\mathbb{R}^3$  must also span  $\mathbb{R}^3$ .
- (True/False) Any set of vectors that contains the zero vector is linearly dependent.
- (True/False) If  $v_1, v_2, v_3, v_4$  are linearly independent in  $\mathbb{R}^4$ , then  $v_1, v_2, v_3$  are also linearly independent in  $\mathbb{R}^4$ .
- (True/False) If  $v_1, v_2, v_3$  are linearly dependent in  $\mathbb{R}^3$ , then  $v_1, v_2$  are also linearly dependent in  $\mathbb{R}^3$ .

## Question 2 (6 points)

Determine if  $(1, 2, 3, 1)$ ,  $(0, 1, 1, 1)$ ,  $(0, 1, 2, -1)$ , and  $(-1, -3, -5, 0)$  form a basis for  $\mathbb{R}^4$ .

**Question 3 (6 points)**

Find the span of the vectors  $(1, 2, 1, 1)$ ,  $(1, 0, 0, 1)$ ,  $(2, 2, 1, 2)$  in  $\mathbb{R}^4$ . (In particular, describe all  $(a, b, c, d)$  that are in this span by giving conditions on  $a$ ,  $b$ ,  $c$ , and  $d$ ).

Find one vector in  $\mathbb{R}^4$  that is not in  $\text{Span}\{(1, 2, 1, 1), (1, 0, 0, 1), (2, 2, 1, 2)\}$ .