

Name: \_\_\_\_\_

Section (if any): \_\_\_\_\_

MATHEMATICS E-23a, Fall 2016  
Final Examination  
Wednesday, December 14, 2016

You may omit one multiple-choice question in Part I, one question in Part III, and one proof in Part IV.

If you transcribe your multiple-choice answers onto this page and mark the omitted questions in parts I, III, and IV with an X in the Score column you receive 1 point of extra credit.

You may use the printed set of executive summaries that you brought to the exam.

You may also use a calculator, but only for arithmetic, perhaps in support of Newton's method.

No other aids or references are allowed.

Problem	Answer	Points	Score
<i>I</i> – 1		2	
<i>I</i> – 2		2	
<i>I</i> – 3		2	
<i>I</i> – 4		2	
<i>I</i> – 5		2	
<i>I</i> – 6		2	
<i>II</i>	--	6	
<i>III</i> – 1	--	5	
<i>III</i> – 2	--	5	
<i>III</i> – 3	--	5	
<i>III</i> – 4	--	5	
<i>III</i> – 5	--	5	
<i>III</i> – 6	--	5	
<i>III</i> – 7	--	5	
<i>III</i> – 8	--	5	
<i>IV</i> – 1	--	5	
<i>IV</i> – 2	--	5	
<i>IV</i> – 3	--	5	
Marked omit(s)	--	1	
Total		61	

Part I. Answer five of the six multiple-choice questions. Transcribe your answers onto page 1, and mark an X in the score box on page 1 to indicate which question you have omitted.

If you answer all six questions, the last one will be ignored, and you will lose the extra-credit point for marking omitted questions!

1. Question

- (a)
- (b)
- (c)
- (d)
- (e)

2. Question

- (a)
- (b)
- (c)
- (d)
- (e)

3. Question

- (a)
- (b)
- (c)
- (d)
- (e)

4. Question

(a)

(b)

(c)

(d)

(e)

5. Question

(a)

(b)

(c)

(d)

(e)

6. Question

(a)

(b)

(c)

(d)

(e)

Part II(6 points, 2 per false statement) Of the following statements, more than three are false. Choose any three of the false statements and explain why they are false. For full credit you must both comment on what is wrong with the statement and also cite an explicit counterexample. Just ignore the true statements.

Example:

Statement: “Any two unequal nonzero vectors in  $\mathbb{R}^2$  span  $\mathbb{R}^2$ .”

Answer: “False: the vectors could be linearly dependent, like  $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$  and  $\begin{bmatrix} 2 \\ 2 \end{bmatrix}$ ”

1.

Part III. Answer seven of the eight questions. Mark an X in the score box on page 1 to indicate which question you have omitted.

1. (Inspired by Week 9, group problems #)

2. (Inspired by Week 10, group problems #)

3. (Inspired by Week 11, group problems #)

4. (Inspired by Week 12, group problems #)



5. (On an important topic from Weeks 9-12 not covered elsewhere on the exam)

6. (On an important topic from Weeks 9-12 not covered elsewhere on the exam)

7. (On an important topic from Weeks 9-12 not covered elsewhere on the exam)

8. (On an important topic from Weeks 9-12 not covered elsewhere on the exam)

Part V. Do two of the three proofs. Mark an X in the score box on page 1 to indicate which proof you have omitted.

1. (Proof X.x)

2. (Proof X.x)

3. (Proof X.x)