Midterm Exam 1
Instructor: Prof. Reza Alam

03/03/2023
25 questions, 50 minutes, 11 pages
Version A

Name: _____

Student ID: _____

Statement of Academic Integrity

UC Berkeley Honor Code: "As a member of the UC Berkeley community, I act with honesty, integrity, and respect for others."

On my honor, I will neither give nor receive any assistance in taking this exam. I will not use any electronic devices during the exam.

Signed: _____

Instructions

1. The exam is closed book. No electronic device is permitted (no calculator, no cellphone, no laptop, no MATLAB).

2. Bring your Cal ID to the exam room.

3. You may bring one 8.5" × 11" sheet of paper of notes.

4. Please do not get up to leave until the exam is over.

5. Read and sign the above statement of academic integrity.

6. Write your full name and SID in the blanks above and on the top of the bubble sheet.

7. An ASCII table is provided on the page 11.

8. Mark the version of your exam on the bubble sheet. Incorrectly marked exam version may result in 0 point in your exam grade.

9. Mark your answers on the bubble sheet with pen or pencil. There is one and only one correct choice for each question. Multiple bubbles, incomplete bubbles, or stray marks will be marked incorrect.

10. At the end of the exam, hand in the completed bubble sheet AND the exam.

Do not open the exam book until instructed to do so.

1. Let two arrays A and B be defined as:

```
>> A = 2:6
>> B = [1 2 3 2 1]
```

What is the output of the following command?

```
>> size([A; B])
```

   (a) 1 10
   (b) 10 1
   (c) 2 5
   (d) 5 2

2. Consider the code:

```
A=[1:3; 2:2:6; 3:-1:1];
```

What is the output when the following command is implemented?

```
B = A'
```

   (a) B =
       Inf Inf Inf
       Inf Inf Inf
       Inf Inf Inf

   (b) B =
       3 2 1
       2 4 6
       3 2 1

   (c) B =
       3 2 1
       6 4 2
       1 2 3

   (d) B =
       1 2 3
       2 4 2
       3 6 1

3. What will be the outcome of the following code?

```
clear all; clc;
a = 1; b = 2; c = 1;
f = @(x) a*x^2 - b*x +c;
b = 3;
disp( f(3) )
```

  (a) 1

  (b) 4

  (c) 5

  (d) 7

4. Which of the following does not produce the result 195.

  (a) `[100] + [95]`

  (b) `'a'+ 'b'`

  (c) `100.0 + 95.0`

  (d) `"a" + "b"`

5. Which of the following expressions does NOT return the first 5 elements of the row vector A?

  (a) `A([1,2,3,4,5])`

  (b) `A(1:5)`

  (c) `A(1,2,3,4,5)`

  (d) `A(1,1:5)`

6. What is the value of `y` in the following code?

```
clear, clc
x = 10;
y = (x<0)*1 + (x~=10)*2 + (x>=5)*(x<=10)*3 + (x<20)*4;
```

  (a) 3

  (b) 5

  (c) 7

  (d) 10

7. After running the following code, what is the correct value of K?

```
clear, clc
A1 = [2, 1; 1 2];
K  = [0 0 0; 0 0 0; 0 0 0];
ind1 = [1, 2];
K(ind1, ind1) = K(ind1, ind1) + A1;
```

  (a) K = [2 1 0; 1 2 0; 0 0 0]

  (b) K = [2 1 0; 0 1 2; 0 0 0]

  (c) K = [0 2 1; 0 1 2; 0 0 0]

  (d) K = [0 0 0; 2 1 0; 1 2 0]

8. Which of the following variable have the same size?

I. `ones(2)`
II. `randi(5,2,2)`
III. `rand(2)`
IV. `randi(1,2)`

  (a) II, III

  (b) I, II, III

  (c) I, III

  (d) All of the above.

9. Which of the following are valid data types in MATLAB?

I. `double`
II. `char`
III. `string`
IV. `logical`

  (a) I and II

  (b) II and III

  (c) I, III and IV

  (d) All of the above.

10. After running the following code, what is the value of variable `c`?

```
a = [1 2 3];
b = [1 2 3];
c = a .* b;
```

(a) `c=[1 4 9]`

(b) `c=[2 4 6]`

(c) `c=15`

(d) `c=[1 2 3]`

11. What is the range of the output values using `rand` function after calling the following code?

```
clear, clc
a = 5*rand(4,2) - 3
```

(a) (4,2)

(b) (-3,5)

(c) (-3,2)

(d) (-3,4)

12. Which is the correct output of x in the following expression?

```
clear, clc
x = linspace(1,5,2);
x = x + 1 / 2;
```

(a) x =
   3 7

(b) x =
   1.5 5.5

(c) x =
   1.50 1.75 2.00 2.25 2.50

(d) x =
   3.00 3.25 3.50 3.75 4.00

13. Which is the correct output of z in the following expression?

```
clear, clc
x = [-7 -8 -9; -10 -11 -12; -13 -14 -15];
y = numel('E7 is Great!');
z =find(~(x + y));
```

(a) 2

(b) 4

(c) 6

(d) 8

14. Which is the final value of `str1`?

```
str1 = 'Go bears'
diff = double(str1(end))-double(upper(str1(end)))
str1(5:end) = str1(5:end)-diff
```

(a) str1 = 'Go beARS'

(b) str1 = 'GobeARS'

(c) str1 = 'Go bEARS'

(d) str1 = 'GobEARS'

15. Which of the following Matlab expressions correctly encodes the following equation:

$$S = \frac{1}{2} \sum_{k=1}^{3} \frac{1}{k^2}$$

Note: $\sum$ (sigma) has the following definition, $\sum_{n=1}^{N} n = 1 + 2 + \ldots + N$

(a) `S = 1/2*sum(1/i)^2`

(b) `S = 1/2*(1/1+1/2+1/3)^2`

(c) `S = (1/2)*sum(1/1+1/2+1/3)^2`

(d) `S = (1/2)*(1/1^2+1/2^2+1/3^2)`

16. Which is the final value of `b`?

```
A = [2 3 5; 1 5 7; 9 3 8]
b = A(A>6)
```

(a) b = $[7; 9; 8]$

(b) b = $[9; 7; 8]$

(c) b = $[7\ 9\ 8]$

(d) b = $[9\ 7\ 8]$

17. What is the size of the variable R?

```
A = [1 2 3; 4 5 6; 7 8 9];
R = A(1:2,:);
```

(a) 3x3

(b) 1x3

(c) 2x3

(d) 3x2

18. Consider the mathematical equation below:

$$y = \ln\left(\frac{1}{2x}\right) + \sin^2(\pi/4) - e^{x^3} \tag{1}$$

Which of the following MATLAB expressions correctly encodes this equation?

(a) `y = ln(1/(2*x))+ sin^2(pi/4)- e^(x^3);`

(b) `y = log(1/2*x)+ sin(pi/4)^2 - exp(x^3);`

(c) `y = ln(1/2*x)+ sin^2(pi/4)- e^(x^3);`

(d) `y = log(1/(2*x))+ sin(pi/4)^2 - exp(x^3);`

19. What is the value of variable `b` after the following code is executed?

```
a = 1:2:5;
for i = 1:length(a)
    b = i + a(i);
end
```

(a) `b = 15`

(b) `b = 8`

(c) `b = 18`

(d) `b = [2 5 8]`

20. What is the value of the variable `c` after running the following code?

```
a = 10;
b = 2;
if (a == 10)
    c = a - b;
    a = 5;
elseif (a == 5)
    b = 3;
    c = a - b;
else
    c = 10;
end
```

(a) `c = 8`

(b) `c = 10`

(c) `c = 3`

(d) `c = 2`

21. What is the output for this script?

```
a = 0;
b = 1;
if (bigger(a,b))
    disp([a, b]);
    a = a + 1;
else
    disp([bigger(a,b), a]);
end

function out = bigger(a,b)
    out = b>a;
end
```

(a) 0 0

(b) 1 0

(c) 0 1

(d) 1 1

22. What's the output of the following code?

```
test1 = [5 11 3];
total = 0;
for i = test1
    if i <= length(test1)
        total = total + 1;
    else
        total = total - i;
    end
end
disp(total)
```

(a) -9

(b) 19

(c) -15

(d) 2

23. What is the output of the following code?

```
x = 2;
y = simcal(x);
disp([x, y])
```

```
function [y] = simcal(x)
    x = 4;
    y = x.^2;
end
```

(a) [2, 16]

(b) [2, 4]

(c) [4, 16]

(d) [4, 4]

24. What is the output of the following code?

```matlab
in = 'abCd';
out = fun(in)
```

```matlab
function out = fun(in)
 out = [];
 for i = in
   if double(i) > 96      %% Hint: double('a') = 97, double('A') = 65
     in = char(double(in) - 32);
     out = [out i];
   else
     out = [out i];
     in = char(double(in) + 32);
   end
 end
end
```

(a) `MATLAB returns an error`

(b) `abCd`

(c) `ABCD`

(d) `ABcD`

25. One primary function `fun` as well as two subfunctions `fun1`, `fun2` are given below. What is the output `out=fun(1, 2, 3)`?

```matlab
function out = fun(in1, in2, in3)
    out1 = fun1(in1, in2);
    out2 = fun2(in1, in3);
    out = out1 + out2;
end
function out = fun1(in1, in2)
    in1 = in1 + in2;
    out = in1 + in2;
end
function out = fun2(in1, in2)
    out = in1 * in2;
end
```

(a) 6

(b) 7

(c) 8

(d) 14

ASCII Table

Dec	Char	Dec	Char
065	A	097	a
066	B	098	b
067	C	099	c
068	D	100	d
069	E	101	e
070	F	102	f
071	G	103	g
072	H	104	h
073	I	105	i
074	J	106	j
075	K	107	k
076	L	108	l
077	M	109	m
078	N	110	n
079	O	111	o
080	P	112	p
081	Q	113	q
082	R	114	r
083	S	115	s
084	T	116	t
085	U	117	u
086	V	118	v
087	W	119	w
088	X	120	x
089	Y	121	y
090	Z	122	z

Dec = Decimal Value
Char = Character

	A	B	C	D	E
1	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
2	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
3	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
4	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
5	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
6	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
7	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
8	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
9	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
10	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
11	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
12	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
13	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
14	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
15	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
16	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
17	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
18	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
19	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
20	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
21	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
22	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
23	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
24	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
25	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ

	A	B	C	D	E
26	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
27	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
28	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
29	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
30	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
31	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
32	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
33	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
34	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
35	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
36	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
37	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
38	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
39	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
40	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
41	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
42	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
43	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
44	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
45	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
46	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
47	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
48	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
49	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
50	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ

	A	B	C	D	E
51	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
52	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
53	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
54	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
55	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
56	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
57	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
58	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
59	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
60	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
61	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
62	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
63	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
64	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
65	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
66	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
67	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
68	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
69	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
70	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
71	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
72	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
73	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
74	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
75	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ

	A	B	C	D	E
76	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
77	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
78	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
79	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
80	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
81	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
82	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
83	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
84	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
85	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
86	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
87	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
88	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
89	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
90	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
91	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
92	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
93	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
94	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
95	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
96	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
97	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
98	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
99	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
100	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ