Sample: CDS130 Final exam   (PART I)

The final exam consists of two sections. The first section is a closed–book paper exam (60 minutes); and the second section involves use of Matlab on the computer (75 minutes). The following part is the first section of the exam.

• Be sure your exam booklet has 8 pages for this section.
• Write your name at the top of each page.
• This is a closed book exam.
• All computational commands and statements appearing in this exam are specifically referring to the Matlab programming language taught in class.
• You may not use Matlab on the computer during this section.
• Absolutely no interaction between students is allowed.
• Each question is worth 5 points. Partial credit may be awarded ONLY if work is shown.
• The exam will take place in IN 326.
• Duration for this section: 60 minutes (10:30am − 11:30am).

Q1. Suppose x is a new variable, with the following Matlab statement,

 x = [-10: -1: -15; -2: 3];

How many elements are generated in x?

(A) 0; because there is an error in the assignment
(B) 10
(C) 12
(D) 5
(E) 6

Answer:_____

Q2. A matrix was generated using

M = rand(10);

Which of the following statements is **not** valid in Matlab?
(A) M+M*2
(B) M(1, :)^2
(C) sin(M)
(D) exp(M)
(E) M(10,10)+M(3,6)

Answer: _____

Q3. What is the output of executing the following Matlab code?

```
clear;
for i=1:5
   for j=i:5
    M(i, j) = i+j;
    M(j, i)= M(i,j);
   end
end
M(4, 3)
```

Answer:

Q4. In order to print formatted integers with the following format,

00005

00006

00007
00008
00009
00010

which fprintf statement should be used in the following code?

```
for i=5:10
    fprintf(        )
end
```

(A) fprintf('%5.5f\n', i)
(B) fprintf('%5.2d\n', i)

(C) fprintf('%05d', i)
(D) fprintf('%5.5d\n', i)
(E) fprintf('%d\n', i)

Answer: _____

Q5. Involving fprintf and nested for-loop commands, write a Matlab script to print the following pattern:

1
12
123
1234
123456
1234567

Answer:

Q6. Given the following Matlab code,

```
k= 0;
while  k ^0.5 < k

    k = k + 1;
end
k
```

what is the value of k after executing the code ?

(A) 0
(B) 1
(C) 2
(D) 3
(E) 4

Answer:_____

Q7. Using one if-statement to rewrite the following nested if-statement

if w < x
  if w > y
    w = x*y
  end if
end if

Answer:

Q8. Using nested for-loops to generate a matrix that has elements shown below (without typing the numbers explicitly):

$$A = \begin{pmatrix} 12 & 8 & 4 & 0 & -4 \\ 14 & 10 & 6 & 2 & -2 \\ 16 & 12 & 8 & 4 & 0 \end{pmatrix}$$

Answer:

Q9. Given vectors x=[-1, 2, 3, -2], y=[0.2, 3.1, 0, -3] and z=[3, 0, 1, 0.1], provide answers to the following operations

(A) x < y > z

Answer: _____

(B) x + ~y > z

Answer: _____

(C) x == y ~=z

Answer_____

Q10. Images in Matlab are represented by matrices. In order to properly display the image with desired colors, a color map is needed (for indexed images). Given a matrix

$$M = \begin{pmatrix} 0.1 & 0.5 & 0.7 \\ 0.9 & 0.4 & 0.6 \\ 0.5 & 0.8 & 0.2 \end{pmatrix}$$
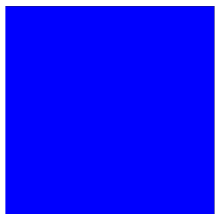
with the following Matlab code:

```
M=[0.1, 0.5, 0.7; 0.9, 0.4, 0.6; 0.5, 0.8, 0.2];
colormap(M);
imagesc(~(M>0.5))
axis square off
```

Which of the following statements is most likely correct?

(A) No image will be produced, because the colormap is not properly assigned.

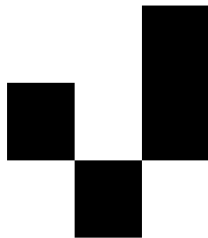(B) The following image will be produced:

(C) The following 3-color image will be produced:

(D)The following 2-color image will be produced:

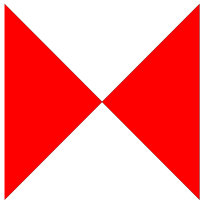

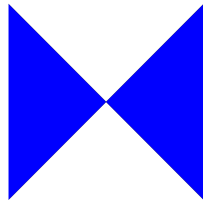(E) The following white and black image will be produced:

Answer: _____

Q11. The 'fill' command can be used to plot polygons with filled colors. Which plot will be generated by executing the following command lines?

clear;
fill([0, 1, 1, 0], [1,1, 0, 0], [0,0,1]);
axis square off;

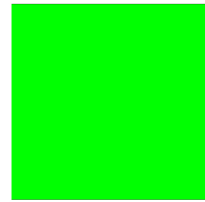(A)   (B)   (C)   (D)

Answer:

Q12. Write a Matlab code to calculate the following summation:

$3*(2+1)+4*(3+2+1)+5*(4+3+2+1)+6*(5+4+...+1)+....+1000*(999+...+1)$

Sample: CDS130 Final exam   (PART II)

The final exam consists of two sections. The first section is a closed-book paper exam (60 minutes); and the second section involves use of Matlab on the computer (75 minutes). The following part is the section section of the exam.

• You are required to use Matlab to solve the problems.
• Absolutely no interaction between students is allowed.
• Partial credit may be awarded ONLY if work is shown.
• Turn in your Matlab code and final answer to each question by email or in paper form.
• Duration for this section: 70 minutes (11:30am – 12:45am).

1. (15 points) Write a Matlab script to create an image as follows:
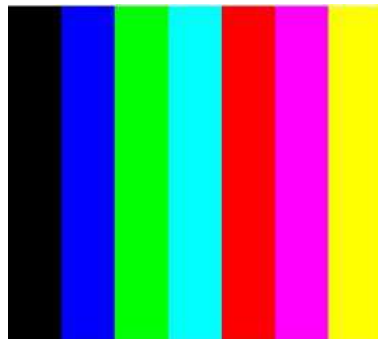
2. (10 points) Given a mathematical function $f(x)=x^2-\sin(x)$, calculate the area underneath the curve from x=1.3, x = 8.7.

(3) (15 points) You won \$100 and want to invest it. Which bank offers the better deal?

Bank A: 12% interest per year compounded yearly

Bank B: 1% interest per month compounded monthly

Bank C: (1/365.2425)% interest compounded daily

"Compounded yearly/monthly/daily" means that at the end of one year/month/day the interest is added to your balance.