

1 Bits, Bytes, Characters, Strings (5 points)

- How many bits make up a byte? 8
- If typing 'A' + 4 displays 69 on the screen, what would 'C'-5 display?
62
- How many characters are there in the string 'CS 1109'? 7

2 Variables, Assignment (10 points)

```
x = 2;  
y = 3; p = isprime(x);  
z = 5; q = rem(z,y);  
z = z + y * x;  
x = z - x - y;  
y = x / y + z;
```

What are the final values for

x: 6 y: 13 z: 11 p: 1 q: 2

3 MATLAB Specific (5 points)

- What is the character used to denote comment lines? %
- What is the command to clear screen? clc
- What is the command to see all the workspace variables? who, whos
- What is the command to clear all the workspace variables? clear all
- What is the command to see which version of a function will be run?
which

4 Operators (10 points)

What are the results of the following expressions?

2+0+1+2 % 5

2*0*12 % 0

[2 0 1].^2 % [4 0 1]

23 ~= 19 % 1

17 < 71 % 1

```

2 > 0 > 1 > 2          % 0
~ (1 && 1 || 0)        % 0
1 && 3 < 2             % 0
(~0 & 1) || (0 & 1)    % 1
(~(0&1)) || (1&1)     % 1

```

5 Functions (10 points)

```

function [a,s,r] = compute_triangle (x,y,z)
% using the sidelengths of a triangle, computes the semiperimeter,
% area, and the radius of the tangent circle

```

```

p = x+y+z;
s = p/2;
a = sqrt(s*(s-x)*(s-y)*(s-z));
r = a/s;

```

- What is the name of this function? `compute_triangle`
- What should be the filename for this function? `compute_triangle.m`
- Which variables are input variables? `x,y,z`
- Which variables are output variables? `a,s,r`
- If we type `[a,s,r] = compute_triangle (3,4,5)`
What are values of `a`: 6 `s`: 6 `r`: 1 ?

6 Random Numbers (2 points)

- What is the function which generates a random number between 0 and 1?
`rand`
- What is the function which generates random integers? `randi`

7 Rounding Functions (3 points)

What are the results of the following statements?

```
ceil(1.109)      % 2
```

```
floor(1.109)     % 1
```

```
fix(1.109)       % 1
```

8 Colon Notation (10 points)

Write down the arrays generated by the following statements.

```
1:pi             % [1 2 3]
```

```
-2:2:2          % [-2 0 2]
```

```
0.1:0.2:0.8     % [0.1 0.3 0.5 0.7]
```

```
'K':'Q'         % 'KLMNOPQ'
```

```
'f':-2:'a'      % 'fdb'
```

9 Branching (5 points)

```
x = 1/sqrt(2); y = 1/sqrt(3); % coordinates of a point
```

```
if x^2 + y^2 > 1
    disp('Outside the unit circle');
else
    disp('Inside the unit circle');
end
```

- Fill in the condition for the `if/else` statement, so that the displayed message would be correct. Unit circle is centered at origin with radius 1.
- What will be displayed on the screen? Inside the unit circle

10 While Loop (10 points)

```
a = 4; b = 10; c = 3;
while a > 3
    a = a + c;
    b = b - c;
    c = - c - 1;
end
```

What are the final values for

a: 3

b: 11

c: 3

11 Array Indexing (10 points)

Given $A = [2, 3, 5, 7, 11]$; $B = [1, 1, 2, 3, 5]$; $C = [0, 1, 1, 0, 1]$, write down the results of the following statements.

```
A(end) % 11
A(3)/B(2) % 5
A(5) + B(3) * C(4) % 11
A + B - C % [3 3 6 10 15]
A.*C % [0 3 5 0 11]
C./B % [0 1 0.5 0 0.2]
sum(B(2:end-1)) % 6
C([1 3 5]) % [0 1 1]
A(1:2:5) + B(5:-2:1) % [7 7 12]
C(B(3:end)).*A(B(1:3)) % [2 2 3]
```

12 For Loop (10 points)

```
p = 1; q = p; s = 2.7;
for j = 3:2:6
    p = j*p;
    q = q^2-p;
    s = s + j;
end
```

What are the final values for

p: 15

q: -11

s: 10.7

13 Matrices (10 points)

Given the matrix A ,

```
A = [2, 5, 4, 3;
     7, 1, 0, 2;
     6, 4, 9, 8];

[r c] = size(A); s = 0;
if r>c, m = c, else m = r, end;
for j = 1:m,
    s = s + A(j,j);
end
```

What is the final for the variables?

r: 3 c: 4 m: 3 j: 3 s: 12

14 Bonus

14.1 if/elseif/else (10 points)

The three interior angles of any triangle add up to 180° . Complete the program fragment below to print scalene, isosceles, or equilateral given three angles.

```
% Assume a,b, and c are positive integers that sum to 180
if (a ~= b && a ~= c && b ~= c)
    disp('Scalene triangle')
elseif (a == b && a == c && b == c)
    disp('Equilateral triangle')
else
    disp('Isosceles triangle')
end
```

14.2 Rectangle (10 points)

Write a function called `rectangle` which computes the area and perimeter of rectangle using the two side lengths a, b .

```
function [A, P] = rectangle(a,b)

    A = a*b;
    P = 2*(a+b);

end
```

14.3 Nested Loop (10 points)

```
p = 1; q = p; s = 2012;
for j = -3:5
    s = q + j;
    for k = j:2:1
        p = p * k * j;
    end
end
end
```

What are the final values for

p: 0 q: 1 s: 6

14.4 Switch/Case (10 points)

```
N = 10000; p = 0; n = 0;
for j = 1:N
    d = fix(10*rand);
    switch d
        case {2,3,5,7}
            p = p + 1;
        otherwise
            n = n + 1;
    end
end
fprintf('%f %f \n',p/N,n/N);
```

When we run the script above, two decimal numbers will be displayed on the screen, what will they be?

p/N: 0.4 (approximately) n/N: 0.6 (approximately)

14.5 Mixed (10 points)

```
strcmp('CS 1109','cs 1109')                      % 0

find([0 1 2 3 4 5 6] == 3)                      % 4

primes(20)                      % [2 3 5 7 11 13 17 19]

assert(exp(1) < pi)                      % nothing happens

upper('Hello World')                      % 'HELLO WORLD'
```