

MECE 101 Final

Name:

Surname:

Number:

Signature:

Q1) A function is given below:

```
function[output1,output2,output3]=sinav_function(a,b,k,n)
for i=1:n,
    a=k*(a+b);
    k=b;
    b=a;
end
output1=a;
output2=b;
output3=k;
end
```

$i=1$ $a=2$ $b=1$ $b=2$ Spec	$i=2$ $a=4$ $b=2$ $b=4$ Spec	$i=3$ $a=16$ $b=4$ $b=16$ Spec	$i=4$ $a=128$ $b=16$ $b=128$ Spec	output1 = 128 output2 = 128 output3 = 16 Spec
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We call this function as:

```
[output1,output2,output3]=sinav_function(1,1,1,4)
```

What is 'output1', 'output2' and 'output3'? (25 points).

Q2) A function is given below:

```
function [count_perfect,count]=division_rule(n,k)
count_perfect=0;
count=0;
number=n;
while number>1,
    division1=number/k;
    division2=floor(number/k);
    if division1==division2,
        number=division1;
        count_perfect=count_perfect+1;
    else
        number=division2;
        count=count+1;
    end
end
end
```

(a) $\text{count_perfect} = 0$
 $\text{count} = 0$
 $\text{number} = 81$

while-1 division1 = 27 division2 = 27 number = 27 count_perfect = 1 3	while-2 division1 = 9 division2 = 9 number = 9 count_perfect = 2 3	while-3 division1 = 3 division2 = 3 number = 3 count_perfect = 3 3
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- a) We call this function as below. What is 'count_perfect' and 'count'? (25 points)
[count_perfect,count]=division_rule(81,3) $\text{count_perfect} = 4$ $\text{count} = 6$
- b) We call this function as below. What is 'count_perfect' and 'count'? (25 points)
[count_perfect,count]=division_rule(22,2)

Hint: 'floor' function in MATLAB rounds the input towards negative infinity

Ex: floor(5.0001) → 5, floor(5) → 5, floor(5.999999) → 5, floor(4.999) → 4, floor(0.0001) → 0

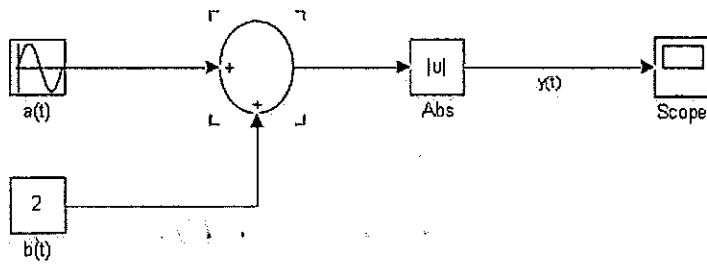
b)

count_perfect = 0 count = 0 number = 22	while-1 division1 = 11 division2 = 11 number = 11 count_perfect = 1 3	while-2 division1 = 5.5 division2 = 5 number = 5 count = 1 3	while-3 division1 = 2.5 division2 = 2 number = 2 count = 2 3	while-4 division1 = 1 division2 = 1 number = 1 count_perfect = 2 3
---	--	---	---	---

end of while
count_perfect = 6
count = 6
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3) For the Simulink model below the inputs are $a(t)=5\sin(2\pi f_1 t)$ where $f_1=0.25$ Hertz, $b(t)=2$. There is a summation component and absolute value taking component as in the figure.



- a) What is $y(t)$? (10 points)
 b) Draw $y(t)$ (for drawing use the figure with grids below). (15 points)

$$y(t) = \left| 5 \sin\left(2\pi \times \frac{1}{4} t\right) + 2 \right|$$

