BLOCK DIAGRAM REDUCTION

Experiment Number: 04

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Aim:

The goal of this exercise is to learn block diagram reduction in MATLAB

Block Diagram Reduction - MATLAB Commands Used

#tf(G1, G2)

#series(G1, G2)

#parallel(G1, G2)

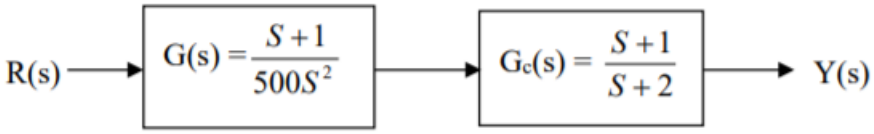
#feedback(G1,G2)

#append(G1, G2)

#connect(sys, Q, input, output)

#tf2ss (num,den)

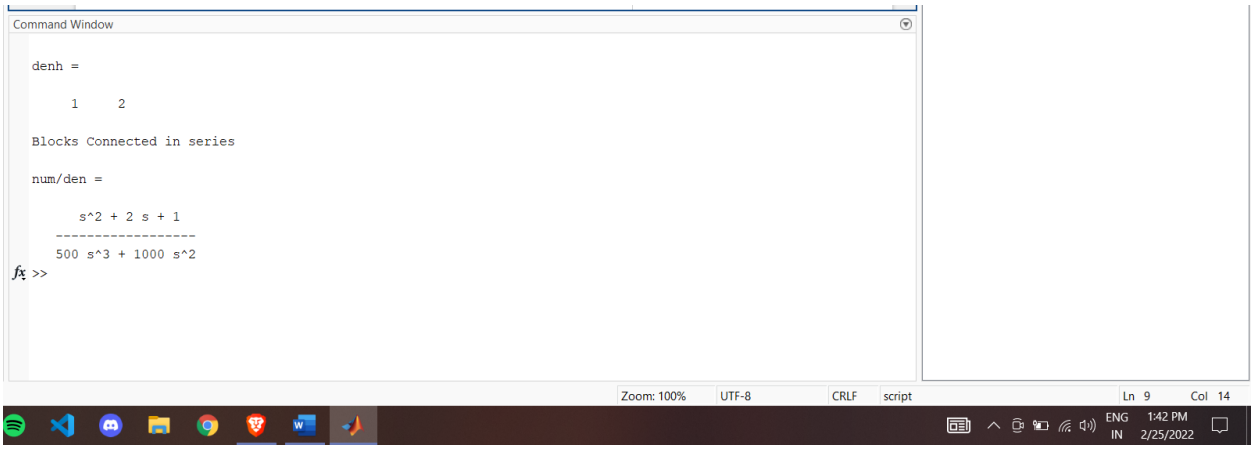
1.) Blocks connected in series:



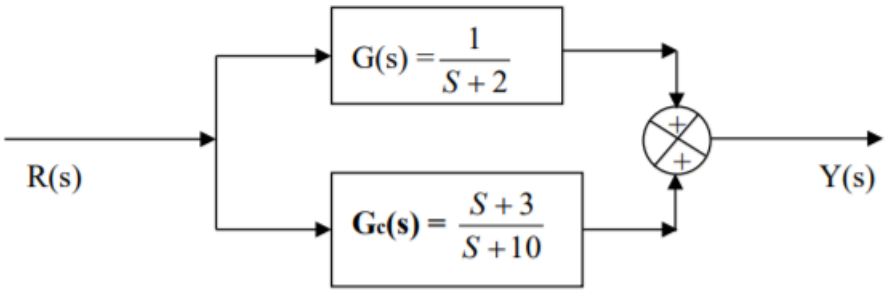
Code:

```
clc
clear all
numg=[1 1];
deng = [500 0 0];
numh=[1 1];
denh = [1 2]
[num, den]= series(numg,deng,numh,denh);
disp("Blocks Connected in series")
printsys (num,den)
```

Output:



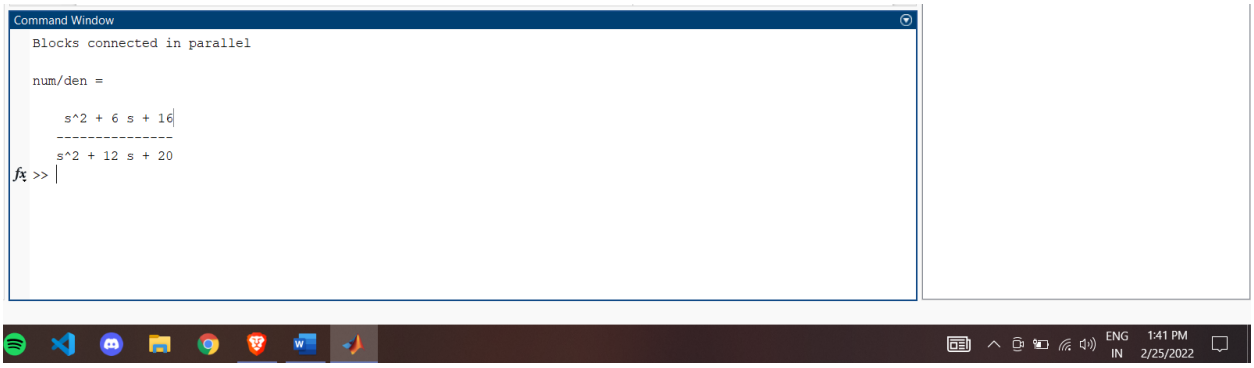
2.) Blocks connected in parallel:



Code:

```
%Blocks connected in parallel
clc
clear all
num1 = 1;
den1 =[1 2];
num2 =[1 3];
den2 =[1 10];
[nump, denp] = parallel(num1, den1, num2, den2);
disp("Blocks connected in parallel")
printsys(nump, denp);
```

Output:

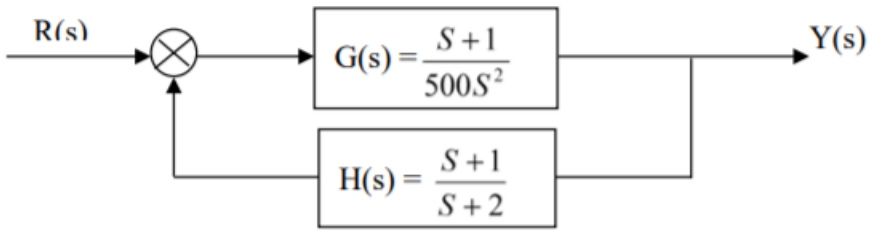


3.) Feedback function:

command : [num, den] = feedback(num1, den1, num2, den2, sign)

Single loop

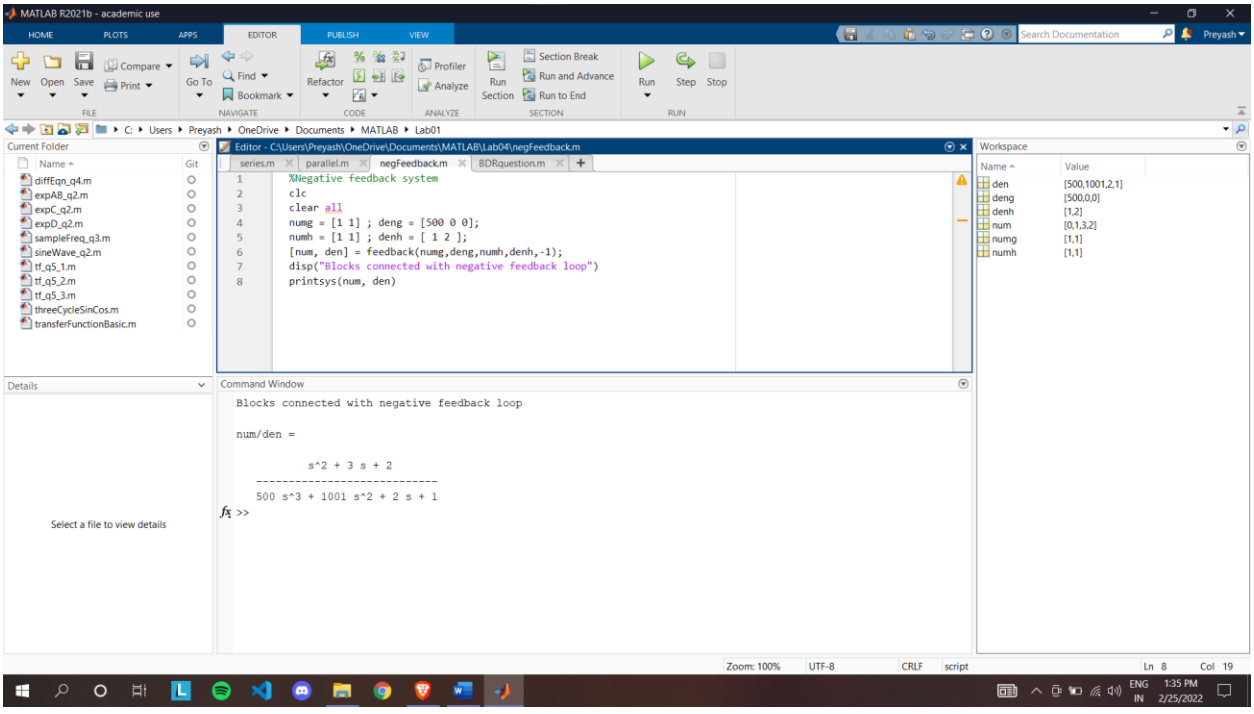
Example :1



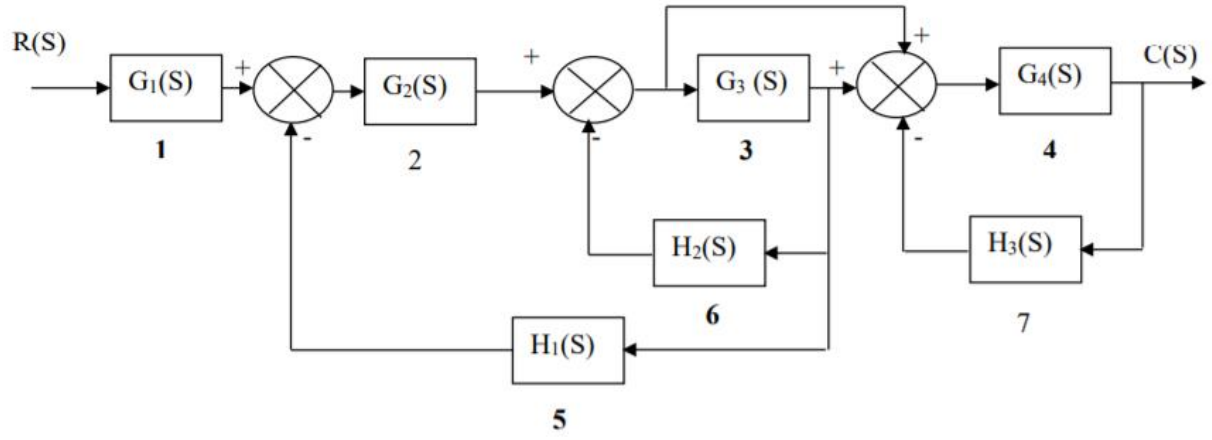
Code:

```
%Negative feedback system
clc
clear all
numg = [1 1] ; deng = [500 0 0];
numh = [1 1] ; denh = [ 1 2 ];
[num, den] = feedback(numg,deng,numh,denh,-1);
disp("Blocks connected with negative feedback loop")
printsys(num, den)
```

Output:



Question: **Write a code to reduce the block diagram and obtain the transfer function.**



Let $G_1(s) = 1$ $G_2(s) = 1/(s+1)$,

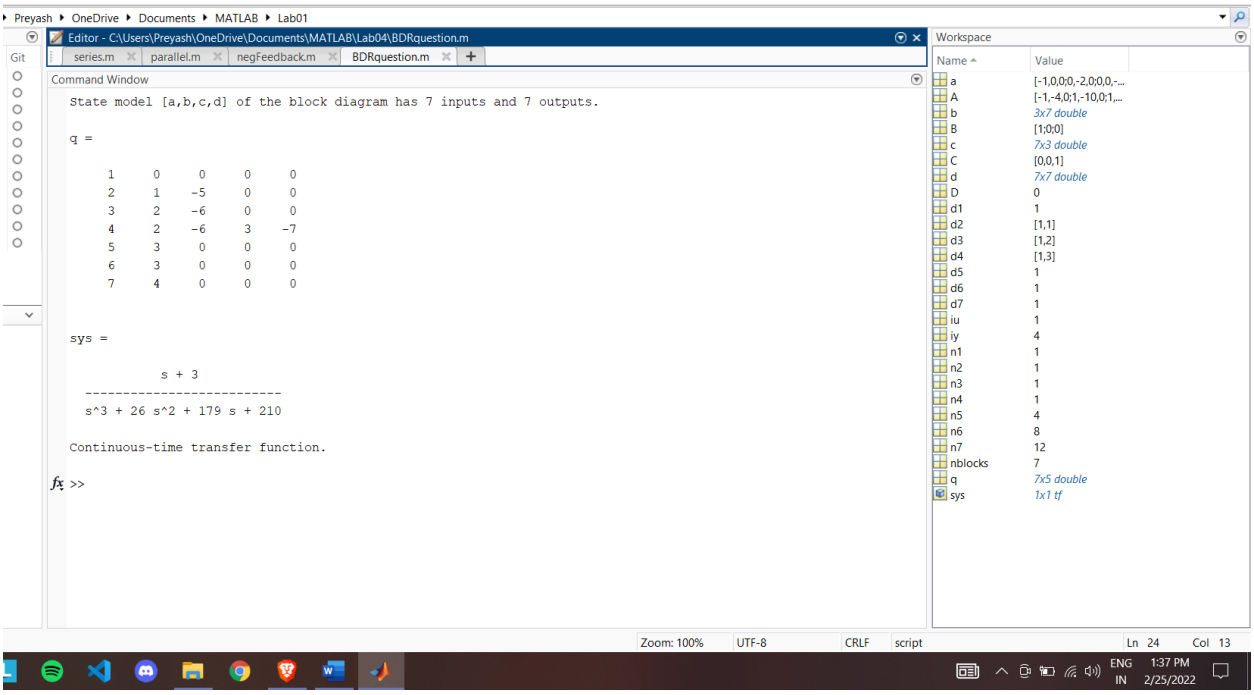
$G_3(s) = 1/(s+2)$ $G_4(s) = 1/(s+3)$,

$H_1(s) = 4$ $H_2(s) = 8$, $H_3(s) = 12$,

Code:

```
%Block diagram reduction question
clc
clear all
n1=1;d1=1;
n2=1;d2=[1 1];
n3=1;d3=[1 2];
n4=1;d4=[1 3];
n5=4;d5=1;
n6=8;d6=1;
n7=12;d7=1;
nblocks=7;
blkbuild
q = [ 1 0 0 0 0
    2 1 -5 0 0
3 2 -6 0 0
4 2 -6 3 -7
5 3 0 0 0
6 3 0 0 0
7 4 0 0 0 ]
iu = 1;
iy = 4;
[A,B,C,D]=connect(a,b,c,d,q,iu,iy);
sys=ss(A,B,C,D);
sys=tf (sys)
```

Output:


Preyash ▸ OneDrive ▸ Documents ▸ MATLAB ▸ Lab01
Editor - C:\Users\Preyash\OneDrive\Documents\MATLAB\Lab04\BDRquestion.m
series.m
parallel.m
negFeedback.m
BDRquestion.m
Command Window
State model [a,b,c,d] of the block diagram has 7 inputs and 7 outputs.
q =
1 0 0 0 0
2 1 -5 0 0
3 2 -6 0 0
4 2 -6 3 -7
5 3 0 0 0
6 3 0 0 0
7 4 0 0 0
sys =
s + 3
s^3 + 26 s^2 + 179 s + 210
Continuous-time transfer function.
>>
Workspace
Name
Value
a [-1,0,0;0,-2,0;0,0,-...
A [-1,-4,0;1,-10,0;1,...
b 3x7 double
B [1;0;0]
c 7x3 double
C [0,0,1]
d 7x7 double
D 0
d1 1
d2 [1,1]
d3 [1,2]
d4 [1,3]
d5 1
d6 1
d7 1
iu 1
iy 4
n1 1
n2 1
n3 1
n4 1
n5 4
n6 8
n7 12
nblocks 7
q 7x5 double
sys 1x1 tf
Zoom: 100%
UTF-8
CRLF
script
Ln 24
Col 13
ENG
IN
1:37 PM
2/25/2022