Jonathan Sumner

Lab 4 – Transfer Function

EEET-332.01 – Signals, Systems, and Transformers Lab

Due Date: 10/06/2024

Lab 4

Section 1 H=Vout/Vin

```
syms s R1 R2 C
Zc = 1/(s*C)
Zs = simplifyFraction(R2 + Zc)
H = simplifyFraction(Zs/(R1+Zs))
R1 = 4; R2 = 2; C = 3;
H = subs(H)
```

Zc =

$$\frac{1}{C\,s}$$

Zs =

$$\frac{C\,R_2\,s+1}{C\,s}$$

H =

$$\frac{C\,R_2\,s+1}{C\,R_1\,s+C\,R_2\,s+1}$$

H =

$$\frac{6\,s+1}{18\,s+1}$$

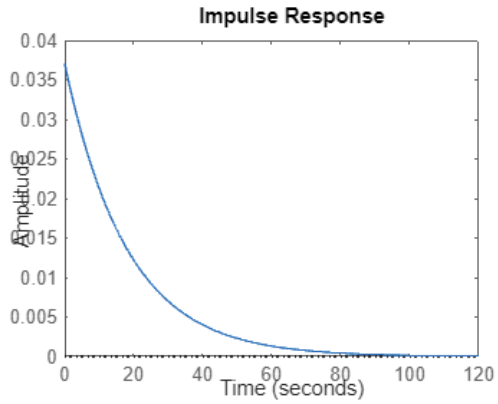
Section 2 Impulse and Step

```
[sysNum, sysDen] = numden(H)
num = sym2poly(sysNum)
den = sym2poly(sysDen)

HTF = tf(num,den)

impulse(HTF)

roots(den)
pole(HTF)
pzmap(HTF)
```

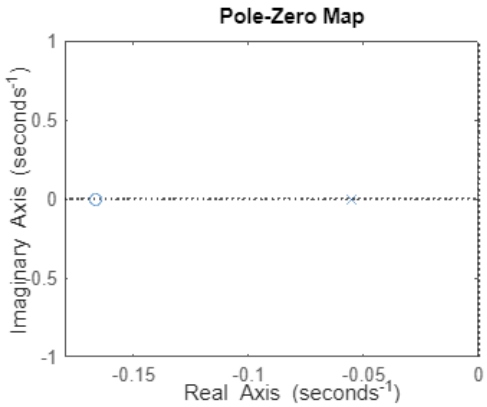
sysNum = $6s + 1$

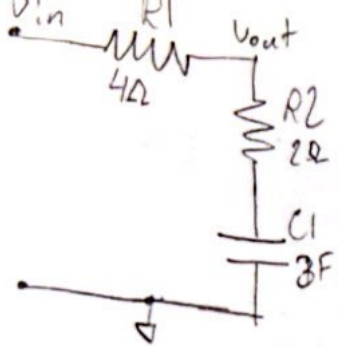
sysDen = $18s + 1$

```
num = 1×2
     6     1

den = 1×2
    18     1

HTF =

  6 s + 1
  --------
  18 s + 1

Continuous-time transfer function.
Model Properties
```




```
ans = -0.0556
ans = -0.0556
```





$$H = \frac{V_{out}}{V_{in}}$$

$Z_{R1} = R1$

$Z_{R2} = R2$

$Z_{C1} = \frac{1}{sC1}$

$$Z_s = Z_{R2} + Z_{C1} = \frac{C(R_2)s+1}{Cs}$$

$$H = \frac{Z_s}{Z_{R1}+Z_s} = \frac{C(R_2)s+1}{C(R_1)s + C(R_2)s+1} = \frac{3(2)s+1}{3(4)s+3(2)s+1} = \frac{6s+1}{12s+6s+1} = \boxed{\frac{6s+1}{18s+1}}$$

Signals Systems and Transforms
EEET-332
Lab 4

Report:

Create your own cover page.

Submit your cover page, the requested solutions and screenshots from sections 1 and 2, and this sign-off sheet.

Sign-offs

Name Jonathan Sumner

Section 3: Transfer function by hand and MATLAB

Signature	Date
JS	09/30/24

Section 4-1: Impulse, poles and pzmap

Signature	Date
JS	09/30/24

Section 4-2: Step Response (underdamped and critical/overdamped)

Signature	Date
JS	09/30/24