EN3143: Electronic Control Systems

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Exercise Number: 2

MATLAB implementation

```
clc;
close all;

%Problem1
num = [20];
den = [3 8 20];
F= tf(num, den)

stepplot(F); %plot step response of the transfer function

%Problem2
num = [11 88 165];
den = [1 9 14 0];

F = tf(num, den)
[numf, denf,kf] = tf2zp(num, den) %obtain the factored form of the transfer function
```

Figure 1: MATLAB implementation for Problem 1 and Problem 2

```
F =

         20
  -----------------
  3 s^2 + 8 s + 20

Continuous-time transfer function.
```

Figure 2: MATLAB implementation results on the command window for Problem 1

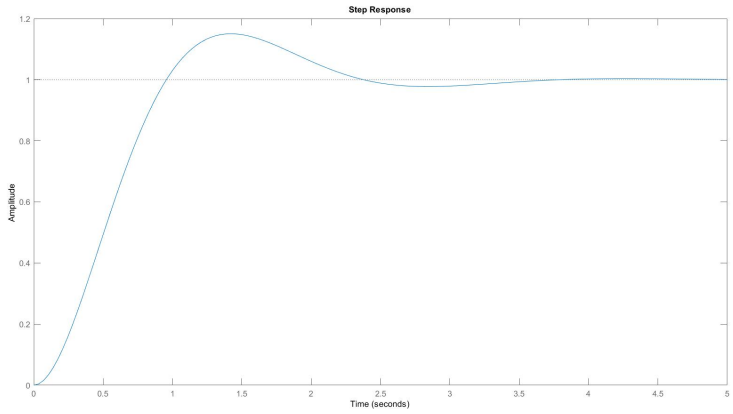

Figure 3: MATLAB plot for Problem 1: step response of the transfer function

```
F =

  11 s^2 + 88 s + 165
  -------------------
  s^3 + 9 s^2 + 14 s

Continuous-time transfer function.


numf =

    -5
    -3


denf =

     0
    -7
    -2


kf =

    11
```

Figure 4: MATLAB implementation results on the command window for Problem 2

Therefore, for problem 2, the factored form of the transfer function is:

$$F(s) = \frac{11(s+5)(s+3)}{s(s+7)(s+2)} \tag{1}$$