



Electrical and Computer Engineering Department
ENCS515, Advanced Computer Systems Engineering laboratory

Final Theoretical Exam

Name: _____

Number: _____

Q1: Compute $y(t) = x(t) * h(t)$ where :

$$x(t) = \begin{cases} 2u(t), & -1 < t < 4 \\ 0, & \text{otherwise} \end{cases} \quad \text{and} \quad h(t) = \begin{cases} 3u(t), & 0 < t < 2 \\ 0, & \text{otherwise} \end{cases}$$

Then write a MATLAB code that plots the $x(t)$, $h(t)$, and $y(t)$. (18%)

Q2: A discrete - time system is described by the difference equation

$$Y[n] + 0.5y[n-1] = x[n] \quad \text{where } y[n] = 0 \text{ for } n < 0$$

1. Does it represent an FIR filter? Explain. (6%)
2. Compute the transfer function $H(z)$. (10%)
3. Determine if the system is stable or not. Explain. (8%)
4. Determine if the system is memoryless or not. Explain. (8%)
5. Write a MATLAB code to determine the pole-zero plot of the system. (8%)

Q3: Consider the following code and answer the questions below

```
public class ClassA
{
    int X;
    private ClassB b;
    public ClassA()
    {
        b= new ClassB(X);
    }
}
```

1. How to solve the dependency between ClassA and ClassB ? (8%)
2. Explain the concept of dependency injection .(8%)

Q5: How the dependences are managed in Spring framework ?(8%)

Q6: Explain the function of Rest Controllers. When it is used? (8%)

Q7: Model View Controller (MVC) design pattern has many components , explain the role of each one, then the interaction between them?(10%)