## Homework 5\_1

#### Problem 1:

1. A) single valued
2. A) even
3. A)
4. A) single valued
5. A) even

#### Problem 2:

**y = 5x + 2**

1. **a = 5**
2. **b = 2**
3. y = 5 (15) + 2 = **77**

#### Problem 3:

**y = –x -1**

1. a = (y2-y1)/(x2-x1) = **-1**
2. y+2 = -1(x-1) —> y = –x -1 —> **-1**
3. y = -1(-9) -1 = **8**

#### Problem 4:

1. Number of real roots: 1
2. Number of complex-conjugate pairs of roots: 2
3. Value of the real root: -1.0000
4. Absolute value of the imaginary part of the complex conjugate root: 0.8660

coefficients = [1, 2, 2, 1]; % Coefficients of the polynomial equation

roots\_of\_equation = roots(coefficients); % Find the roots

real\_roots = sum(imag(roots\_of\_equation) == 0);

complex\_conjugate\_pairs = sum(mod(imag(roots\_of\_equation), 1e-10) ~= 0); % Accounting for small numerical errors

fprintf('Number of real roots: %d\n', real\_roots);

fprintf('Number of complex-conjugate pairs of roots: %d\n', complex\_conjugate\_pairs);

if real\_roots > 0

fprintf('Value of the real root: %.4f\n', roots\_of\_equation(find(imag(roots\_of\_equation) == 0, 1)));

end

if complex\_conjugate\_pairs > 0

complex\_roots = roots\_of\_equation(imag(roots\_of\_equation) ~= 0);

imaginary\_part = abs(imag(complex\_roots(1))); % Taking the absolute value of the imaginary part

fprintf('Absolute value of the imaginary part of the complex conjugate root: %.4f\n', imaginary\_part);

end

#### Problem 5:

Used same m file as Problem 4:  
coefficients = [2, 6.4721, 10.4721, 10.4721, 6.4721, 2];

1. Number of real roots: 1
2. Number of complex-conjugate pairs of roots: 4
3. Value of the real root: -1.0000
4. Value of the real part of the complex conjugate root with higher imaginary part: -0.3090

#### Problem 6:

1. Time constant () = ***0.2***
2. Damping constant () = **5**

#### Problem 7:

1. Time constant () = ***20***
2. Damping constant () = **0.05**

#### Problem 8:

1. AdB = 20\*log10(20) = 26.0205 dB

#### Problem 9:

1. y = 15 \*cos(5\*1 + ((60/180)\*pi)) = 14.584 rad
2. y = 15 \*cos(5\*1.6 + ((60/180)\*pi)) = -13.943 rad

#### Problem 10:

1. y = 10 \* sin(2\*10) = 9.129

#### Problem 11:

1. g() = sin^8((60/180)\*pi) = 0.8847