**Assignment 1**

**Review of Matlab Calculations**

**Due date Sept 17**

This assignment is a review of ENEL101.

For this assignment fill out this word template with your answers.

Submit a PDF version of your assignment on D2L.

In all assignment questions, angles are in radians unless explicitly indicated otherwise.

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**Q1.** Give the Matlab expression to calculate  and the resulting value of x

**(Matlab input)**

x = ((0.2^5.7)\*((csc(0.2))^3)\*exp(2.7)) + sinh(0.1);

**(Matlab Response)**

x = 0.2970

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**Q2** Define the variables and  , and then compute 

**(Matlab input)**

x = sqrt(3);

y = (0.3\*(x^2)) + sqrt(x);

z = sqrt(exp(1)) + x - log(x) - log10(x);

v = sqrt(tanh(x\*y\*z));

**(Matlab Response)**

v = 1.0000

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**Q3.** Let  and  (that is y is a complex number with ). Determine the vector of .

**(Matlab input)**

x = -2;

y = 0 + 3j;

z = [x^y x\*(y^2) exp(sqrt(x))];

**(Matlab Response)**

z = -0.0000 + 0.0001i 18.0000 + 0.0000i 0.1559 + 0.9878i

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**Q4.** Determine the magnitude and angle (in degrees) of the array of values z in **Q3**.

**(Matlab input)**

x = -2;

y = 0 + 3j;

z = [x^y x\*(y^2) exp(sqrt(x))];

mag = abs(z);

theta = (180/pi) .\* angle(z);

**(Matlab Response)**

mag =

0.0001 18.0000 1.0000

theta =

119.1432 0 81.0285

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**Q5.** A matrix is given as



Determine the matrix 

**(Matlab input)**

x = [1 2 0; 2 7 1; 0 0 5];

z = (3.\*x) + (x.^2);

**(Matlab Response)**

z =

4 10 0

10 70 4

0 0 40

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**Q6.** Assume that



Determine and

**(Matlab input)**

x = [1 2 0; 2 7 1; 0 0 5];

y = [1;2;3];

z = (y.').\*x.\*y;

w = y.\*(y.');

**(Matlab Response)**

z =

1 4 0

4 28 6

0 0 45

w =

1 2 3

2 4 6

3 6 9

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**Q7.** Assume a row vector of samples given as . Also assume a rowvector y calculated with the elements of x given as



where the subscript ‘i’ denotes the element index. Finally we have a matrix . Determine 

**(Matlab input)**

x = -50:1:30;

y = (3.\*(x.^2)) + 2;

Q = [x;y];

z = Q\*(Q.');

**(Matlab Response)**

z =

52380 -4229820

-4229820 639094860

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**Q8.** Three vectors are given as



Use dot() and cross() to compute the vector of 

**(ans)**

**(Matlab input)**

u = [-3 4 -2];

v = [2 -5 -4];

w = [1 -1 -1];

Q = ((dot(u,v))^2)\*(cross(cross(u,v),w));

**(Matlab Response)**

Q =

7452 -6156 13608

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**Q9.**  Use Matlab to determine the approximate value of the sum of the infinite series



your answer should be accurate to about 8 significant figures.

**(Matlab input)**

syms n

digits(8);

x = vpa(symsum((cos(1/n))/((n^3)+2), n, 1, Inf));

**(Matlab Response)**

x = 0.33902846

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**Q10.** Two matrices are given as

 and 

Determine 

**(Matlab input)**

X = [1 2 3; 0 7 7; 1 2 1];

Y = [2 2 3; 7 6 0; 1 2 1];

Q = inv(X).\*(Y+(X.^2));

**(Matlab Response)**

Q =

1.5000 -1.7143 6.0000

-3.5000 7.8571 24.5000

1.0000 0 -1.0000

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**Q11.** Solve the linear set of equations using the \ operator in Matlab



Let , be a column vector of the results.

**(Matlab input)**

A = [4 1 1; 2 1 13; 3 0 -1];

B = [3;2;11];

Q = A\B;

**(Matlab Response)**

Q =

3.8529

-12.9706

0.5588

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**Q12.** A recursive series is formed as



with . Write a for loop in matlab that determines the value of .

**(Matlab input)**

x0 = 0;

x1 = x0;

for n=2:200

x = (3\*x1) - (2\*x0) + 1;

x0 = x1;

x1 = x;

end

**(Matlab Response)**

x =

1.6069e+60

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**Q13** Plot the sequence of



with 

using semilogy() for n=2 to 100

**(Matlab input)**

x0 = 0;

x1 = x0;

for n=2:100

x = (3\*x1) - (2\*x0) + 1;

x0 = x1;

x1 = x;

semilogy(n,x,'-\*');

hold on;

end

xlabel('n');

ylabel('x');

**(Matlab Response)**



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**Q14.** A parametric equation is given by

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for a range of t given as . Produce two plots. In the first plot x(t) and y(t) are superimposed. In the second plot assume x along the abscissa and y along the ordinate. Use subplot() to generate the two plots stacked vertically.

**(Matlab input)**

t = linspace(0, 10);

x = 3\*(t.^1.3) ./ (1 + (t.^3));

y = 3\*(t.^2) ./ (1 + (t.^3));

subplot(2,1,1);

plot(t,x);

hold on;

plot(t,y);

xlabel('t');

ylabel('x(t) and y(t)');

legend('x(t)','y(t)');

subplot(2,1,2);

plot(x, y);

xlabel('x');

ylabel('y');

**(Matlab Response)**