Problem Set #4

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1) Start MATLAB.
To create a symbolic object, use "**sym()**" function with a single argument. The argument should consist of a character string that describes a symbolic expression. For example to create $x^3 - 2y^2 + 3a$, you have to type the following command: S0=sym('x^3-2*y^2+3*a');
Create symbolic objects S1, S2, S3, S4 and S5 for the following arguments:
S1 x^2-9
S2 $(x-3)^2$
S3 x^2-3x-10/x+2
S4 x^3+3 x^2-13x-15
S5 2x-3y+4x+13b-8y
and perform the following commands:
i) factor(S1)
ii) expand(S2)
iii) simplify(S3)
ix) factor(S4)
x) collect(S5)
xi) diff(S4)
xii) inf(S2)

2) Use "**diff()**" function and determine the first and second derivatives of the following functions with respect to their independent variables.
i) x^3-5x^2+2x+8
ii) $(x^2+4x+4)*(x-1)$
iii) $(y^2-2y+2)/(10y-24)$
iv) $(z^5-4z^4-9z^3+ 32)^2$

3) Define functions F1=$6x^3-4x^2$+bx-5, F2= Sin (y), and F3= Sqrt(x). Use "**int()**" function to determine:
i) $\int \mathbf{F1}\,\mathbf{dx}$
ii) $\int \mathbf{F2}\,\mathbf{dy}$
iii) $\int \mathbf{F3}\,\mathbf{dx}$
iv) $\int_a^b \mathbf{F3}\,\mathbf{dx}$
v) $\int_{0.5}^{0.6} \mathbf{F3}\,\mathbf{dx}$

4) Define the following polynomials in Matlab and use "**polyval()**" function to evaluate each polynomial at the given x value.
i) $f_1(x) = x^3 - 3x^2 - x + 3$ (x = -3.5)
ii) $f_2(x) = x^3 - 8x^2 + 20x - 16$ (x = 1.7)
iii) $f_3(x) = -5x^5 + 3x^3 - 2.5x^2 - 2.5$ (x = -0.3)
Find the roots of each polynomial using "**roots()**" command.