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**Assignment – 1**

1. **Value of polynomial sum:** Given the value of x and the coefficients *an* supplied, calculate the value of the polynomial sum .

**ANSWER:**

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| function result = polyFunc(c,x)  n = length(c);  p = c(n);  i = n;  for i = n:-1:2  p = c(i-1) + p\*x;  i = i-1;  end  result = p;  end  **RESULT** – for the coefficient array c = [7 2 0 -3 1 -4 8 11 5 -1 2 3], it will give the value of the polynomial = 7.6834 |

1. **Evaluation of *Sin(x)* within a given error limit by adding up the series:** Use power series expansion in order to evaluate *Sin(x)* for a given *x.* Truncate the series when the value reaches within the accuracy of allowed error *e* (User defined error limit) set by you.

**ANSWER:**

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| function result = Sine(x,e)  x=pi/2;  p=0;  t=x;  i=0;  while t>e  p=p+(-1)^i\*t;  i=i+1;  t=t\*x^(2)/((2\*i+1)\*2\*i);  end  disp(p);  **RESULT** –  Input: pi/2, 1e-5  Output: 1 |

1. **Machine epsilon:** Determine machine epsilon for the computer you are using. Do this for both single precision and double precision floating point numbers.

**ANSWER:**

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| function result = Epsilon()  clear all;  e=double(1); %% or single(1)  while (1+e)~=1  e=e/2;  end  result=e\*2;  end  **RESULT** –  Single: 1.1921e-07  Double: 2.2204e-16 |

1. **Computer arithmetic 1:** Evaluate the expression in two ways   
   (a)   
   (b)   
   for small values of *x*, *x*=[0.1, 0.01, 0.001,0.0001, ..., and so on]. Determine the relative error in both the methods of performing the subtraction. Make a plot of *x* vs. Error in logarithmic scale. Which method is superior, and why?

**ANSWER:**

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| x=10.^(-1:-1:-30);  y1=sqrt(x.^2+1)-1;  y2=(x.^2)./(sqrt(x.^2+1)+1);  loglog(x,double(y1))  figure  loglog(x,abs(y2-y1)./y2) |

1. **Computer arithmetic 2:** It is desired to calculate all integral powers of the number  .  
   It turns out that the integral powers of *x* satisfy a recursive relation:

Show that the above recurrence relation is unstable by calculating *x*14, *x*30, *x*40 and *x*50 from the recurrence relation and comparing with the actual values obtained by using inbuilt function e.g., (a^b) in matlab.

**ANSWER:**

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| x=(5^0.5-1)/2;  p=zeros(1,50);  p(1)=1;  p(2)=x;  for i=3:50  p(i)=p(i-2)-p(i-1);  end  plot(log(abs(p-x.^(0:49)))); |