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//CHAPTER 5

//PROBLEMS: 5.4, 5.7, 5.9, 5.20, Factorial, Insurance

#Q1: 5.4 Fibonacci numbers

Starting from fib(1)=0 and fib(2)=1, write a program, fibonacci.m, that computes the first N fibonacci numbers and their sum.

function [ fib, fibsum ] = fibonacci( n )

% fibonacci.m Outputs first 'n' fibonacci numbers...

fib(1) = 0;

fib(2) = 1;

for i=3:n;

fib(i) = fib(i-2) + fib(i-1);

end

fibsum = sum(fib());

end

>>[fib, fibsum] = fibonacci(6)

fib =

0 1 1 2 3 5

fibsum =

12

#Q2: 5.7 Finding prime numbers

function primes = findprimes( num )

% findprimes reads an integer num >=3, and prints all prime numbers between 3 and that number.

count = 1;

primes(1) = 3;

for i = 3:num

for k = 2:floor(sqrt(i))

if mod(i,k)==0

k = i;

break;

elseif k==floor(sqrt(i))

primes(length(primes)+1) = i;

end

count = count +1 ;

end

end

end

>>primes = findprimes(10)

primes =

3 5 7

#Q3: 5.9 First Pi approximation

Compute the sum for N = 100, 1000, 1 x 10^6, and 1 x 10^7.

function [val] = pival( N )

% pival Calculates the value of pi using the solution to the basel sum. pi^2/6 = sum(1:1/i^2:N)

baselsum = 0;

for i = 1:N

baselsum = baselsum + 1/(i^2);

end

val = sqrt(baselsum\*6);

end

>>[ val ] = pival(100)

= 3.1321

>>[ val ] = pival(1000)

= 3.1406

>>[ val ] = pival(1000000)

= 3.1416

#Q4: 5.20 Monte Carlo Integration

function [ Points, Area ] = MonteCarloCircle( radmax, k )

%pival\_carlo Does monte carlo simulation to estimate the value of pi.

%midx and midy are the middle points to the populated object (square

%and circle), and radmax is the maximum radius of the circle and half

%the total length||width of the square. k determines number of data

%points as 10^k.

Points = 10^k;

x = 2\*radmax\*(rand(Points,1));

y = 2\*radmax\*(rand(Points,1));

figure('color','white');

hold all

x1 = x-radmax;

y1 = y-radmax;

radius\_from\_center = sqrt(x1.^2+y1.^2);

m = 0;

axis square;

for i=1:Points

if radius\_from\_center(i)<=radmax

m=m+1;

plot(x(i),y(i),'b.');

else

plot(x(i),y(i),'r.');

end

end

Area = m\*4\*radmax^2/Points;

end

>>for k=1:7 [ Points(k), Area(k)] = MonteCarloCircle( 1, k); end

>>k = 1:1:7;

>>table(k',Points',Area','VariableNames',{'Input\_k' 'Points' 'Area'})

Input\_k Points Area

\_\_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_\_

1 10 4

2 100 3.08

3 1000 3.14

4 10000 3.1708

5 1e+05 3.1432

6 1e+06 3.1467

7 1e+07 3.1413

#Q5: Write a program to calculate a factorial of any number N

function [x] = FindFact(N)

x = N:-1:0;

x(N+2)=1;

for i=1:N

x(N+2) = x(N+2)\*x(i);

end

end

>>[x] = FindFact(5)

ans =

[5, 4, 3, 2, 1, 0, 120]

#Q6:

% InsurancePremium.m Calculates the cost of automobile insurance based on a users' age and number of accidents.

% Clear Screen

clc;

% Request user's age & init vars

age = input('Please enter your age: ');

incidents = input('How many accidents have you had in the past year?');

premium = 500;

SubCharge = 200;

% Process

if age < 25

premium = premium + 100;

end

if incidents > 0

premium = premium + incidents\*SubCharge;

end

% Display

fprintf('\nYour Premium is $%3.2f\n\n', premium);

>>script = 'InsurancePremium.m'; run(script);

Please enter your age: 27

How many accidents have you had in the past year?2

Your Premium is $900