Answer ALL the questions

1. Write an appropriate function prototype based on the following descriptions:
   1. A function named distance. The function should return a double and have two

double parameters: rate and time

double distance(double rate,double time);

* 1. A function named days. The function should return an int and have three int

parameters: years, months, and weeks.

int days(int years,int months,int weeks);

* 1. A function named getKey. The function should return a char and use no parameters.

char getkey();

1. The following statement calls a function named half, which returns a value that is half that of the argument passed to it.

result = half(number);

Assume that result and number have both been defined to be double variables. Write the

half function. (Note: just write the function. Do not write a complete program.)

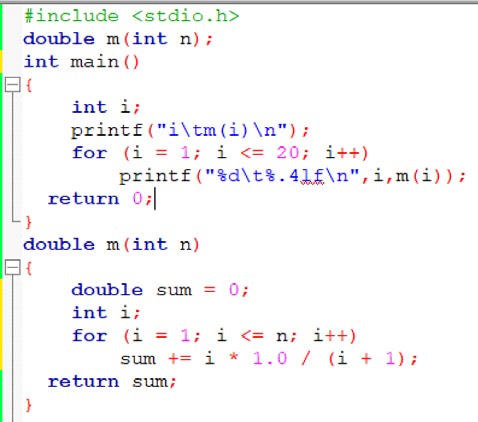
double half(double n)}

{

return n/2;

}

1. What is the output of the following program?



i m(i)

1 0.5000

2 1.1667

3 1.9167

4 2.7167

5 3.5500

6 4.4071

7 5.2821

8 6.1710

9 7.0710

10 7.9801

11 8.8968

12 9.8199

13 10.7484

14 11.6818

15 12.6193

16 13.5604

17 14.5049

18 15.4523

19 16.4023

20 17.3546

1. In physics, an object that is in motion is said to have kinetic energy. The following formula can be used to determine a moving object’s kinetic energy: KE =(1/2)mv2 where KE is the kinetic energy in Joules, m is the object’s mass in kilograms, and v is the object’s velocity, in meters per second. Write a function that accepts an object’s mass and velocity as arguments. The function should return the amount of kinetic energy that the object has.

double kinetic energy(double mass,double velocity);//function prototype//

#include <stdio.h> float KE(float,float);

int main()

{

float kg,mps, k\_e;

printf("Enter the mass of the object in kg: ");

scanf("%f",&kg);

printf("Enter the velocity of the object in meter per second: "); scanf("%f",&mps);

k\_e=KE(kg,mps);

printf("The kinetic energy of the object is %.2f Joules\n",k\_e); return 0;

}

float KE(float m, float v)

{

return 0.5\*m\*v\*v;

}

1. Suppose a particle is moving along the x-axis so that its position at time 𝑡 is given by the formula ff(t) = 3t2+7t-2t5/2
   1. Find the velocity and acceleration as functions of 𝑡.

Velocity: 6t+8-5t^(3/2) Acceleration: 6-(15/2)t^(1/2)

* 1. Write a program that computes the particle position, velocity and acceleration for time 𝑡 =

0 until 𝑡 = 1.5 with increment size of 0.15. Positive velocity is referred to the particle is moving in the positive direction (toward the right). Negative acceleration means that the velocity is decreasing at that point.

(Solution Irham)

#include

#include float position(float m);

float velocity(float f);

float acceleration(float g);

int main()

{

float t,s,v,a;

int n;

printf("Time\t\tPosition\tVelocity\tAcceleration\n"); for(n=0;n<=15;n++)

{

s=position(t);

v=velocity(t); a=acceleration(t); printf("\n%1.1f\t\t%6.2f\t\t%6.2f\t\t%8.2f",t,s,v,a);

t+=0.1;

if(velocity(t)>0) printf("\tMoving to the right with ");

else printf("\tMoving to the left with ");

if(acceleration(t)>0) printf("increasing velocity");

else printf("decreasing velocity");

}

return 0;

}

float position(float m)

{

return (3\*pow(m,2)+8\*m-2\*pow(m,2.5));

}

float velocity(float f)

{

return (-5\*pow(f,1.5)+6\*f+8);

}

float acceleration(float g)

{

return (-7.5\*sqrt(g)+6);

}

(Solution Sir)

#include <stdio.h> #include<math.h> float s(float); float v(float); float a(float); int main()

{

float t;

printf("Time Position Velocity Acceleration\n"); for (t =0.0; t<1.6; t=t+0.1)

{

printf("%-10.1f%-10.2f%-10.2f%10.2f\n",t,s(t),v(t),a(t));

}

return 0;

}

float s(float t)

{

return (3\*pow(t,2)+8\*t-2\*pow(t,2.5));

}

float v(float t)

{

return (6\*t+8-5\*pow(t,1.5));

}

float a(float t)

{

return 6-15.0/2.0\*pow(t,0.5);

}

1. Write a program that demonstrates the functions to compute the average and standard deviation of four scores. Imply the sentinel value to end the program as shown in the sample output file. The following formula can be used to calculate the average and standard deviation.

Graphical user interface

Description automatically generated with medium confidence

The sample output file is shown below:

Press Y to enter the program or press any button to exit: Y Enter 4 numbers, I will give you the mean and standard deviation of the data

12.3

13.4

10.5

9

Mean of 12.30, 13.40, 10.50 and 9.00 is 11.30

The standard deviation of these numbers is 1.122497

Press Y to enter the program or press any button to exit: X You wished to exit. Thank you

(Solution Irham)

#include<stdio.h>

#include<math.h>

float Average(float a,float b,float c,float d);

float StdDv(float a,float b,float c,float d,float mean);

int main ()

{

float a,b,c,d,avg,sd;

char E;

for(;;)

{

printf("Press Y to enter the program or press any button to

exit: ");

scanf("%c",&E);

getchar();

if (E=='Y'||E=='y'){

printf("Enter 4 numbers, I will give you the mean and

standard deviation of the data\n");

scanf("%f",&a);

scanf("%f",&b);

scanf("%f",&c);

scanf("%f",&d);

getchar();

avg=Average(a,b,c,d);

sd=StdDv(a,b,c,d,avg);

printf("Mean of %.2f,%.2f,%.2f and %.2f

is %.2f\n",a,b,c,d,avg);

printf("The standard deviation of these numbers

is %.2f\n",sd);

}

else

break;

}

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printf("You wished to exit. Thank you");

return 0;

}

float Average(float a,float b,float c,float d)

{

return ((a+b+c+d)/4);

}

float StdDv(float a,float b,float c,float d,float mean)

{

float var\_a,var\_b,var\_c,var\_d;

var\_a=(pow((a-mean),2));

var\_b=(pow((b-mean),2));

var\_c=(pow((c-mean),2));

var\_d=(pow((d-mean),2));

return (pow(((var\_a+var\_b+var\_c+var\_d)/3),0.5));

(Solution Sir)

#include <stdio.h>

#include<math.h>

double sD (double s1, double s2, double s3, double s4,double a);

double average (double s1, double s2, double s3, double s4);

int main()

{

double s1, s2, s3, s4, avg, stdDev; char ans;

printf("Press Y to enter the program or press any button to exit: ");

scanf("%c",&ans);

while ( 'Y' == ans || 'y' == ans )

{

printf("Enter 4 decimal numbers,I will give you the mean "); printf("and standard deviation of the data\n"); scanf("%lf%lf%lf%lf",&s1,&s2,&s3,&s4);

avg = average( s1, s2, s3, s4); stdDev = sD( s1, s2, s3, s4,avg);

printf("Mean of %.2lf, %.2lf, %.2lf and %.2lf is

%.2lf\n",s1,s2,s3,s4,avg);

printf("The standard deviation of these numbers is %lf\n",stdDev); printf("Press Y to enter the program or press any button to exit:

");

}

scanf("%c",&ans);

return 0;

}

double average (double s1, double s2, double s3, double s4)

{

return ( s1 + s2 + s3 + s4 ) / 4;

}

double sD (double s1, double s2, double s3, double s4,double a)

{

return sqrt((s1 - a)(s1 - a) + (s2 - a)(s2 - a) + (s3 - a)(s3 - a) + (s4 - a)(s4 - a))/3 ;

}

1. Write a C program to solve the following equations by using the subprograms/functions.

𝑓(𝑥, 𝑦) = 𝑥2 + 𝑦2 − 2𝑥 + 8𝑦 – 8

𝑔(𝑥, 𝑦) =

Let the user enter the values of 𝑥 and 𝑦. Let the user choose either to compute *f(x,y)* or *g(x,y)*. Imply the sentinel value to end the program. Define two functions which handle these equations respectively. Both functions must return a single value. The output must be in the third function which only prints the answer. [Note: Your program consists of **four functions** including the main program]. The sample output file is shown below:

0 to exit the program

1 for f(x,y)=x^2+y^2-2x+8y-8

2 for g(x,y)=1/36\*(x-6)^2+1/16\*(y+4)^2-1

Please choose your function: 1 Enter the value of x and y:

x = -2

y = 1

The value of f(x,y) when x = -2.0 and y = 1.0 is: 9.0

Please choose your function: 0 You wished to exit. Thank you

(Solution Irham)

#include<stdio.h>

#include<math.h>

float One(float x,float y);

float Two(float x,float y);

void print(float x,float y,float ans);

int main()

{

float x,y,ans;

int loop;

printf("0 to exit the program\n");

printf("1 for f(x,y)=x^2+y^2-2x+8y-8\n");

printf("2 for g(x,y)=1/36(x-6)^2+1/16(y+4)^2-1\n\n");

for(;;)

{

LOOP:

printf("Please choose your function:");

scanf("%d",&loop);

getchar();

if(loop==0)

break;

else if(loop<=2)

{

printf("Enter value of x and y:\nx=");

scanf("%f",&x);

printf("y= ");

scanf("%f",&y);

getchar();

if(loop==1)

ans=One(x,y);

else if(loop==2)

ans=Two(x,y);

else

goto LOOP;

print(x,y,ans);

}

else

goto LOOP;

}

printf("You wished to exit. Thank you.");

return 0;

}

float One(float x,float y)

{

float ans;

ans=x\*x+y\*y-2\*x+8\*y-8;

}

float Two(float x,float y)

{

float ans;

ans=pow(36,-1)\*(x-6)\*(x-6)+pow(16,-1)\*(y+4)\*(y+4)-1;

}

void print(float x,float y,float ans)

{

printf("The value of f(x,y) when x = %.1f and y = %.1f

is: %.1f\n",x,y,ans);

}

(Solution Sir)

#include<stdio.h>

float f\_function(float,float); float g\_function(float,float);

void printFunction (int , float ,float ,float); int main (void)

{

int func;

float i,j,result;

//printf("Given two equations:\nf(x)=3x+5\ng(x)=4x+8\n\n"); printf("0 to exit the program\n1 for f(x,y)=x^2+y^2-2x+8y-8\n2 for g(x,y)=1/36\*(x-6)^2+1/16\*(y+4)^2-1\n");

printf("\nPlease choose your function: "); scanf("%d",&func);

// printf("\n"); while(func==1 || func==2)

{

printf("Enter the value of x and y:\n"); printf("x = ");

scanf("%f",&i);

printf("y = ");

scanf("%f",&j); if(func == 1){

result = f\_function(i,j);

}

if(func== 2){

result= g\_function(i,j);

}

printFunction(func,i,j,result);

printf("0 to exit the program\n1 for f(x,y)=x^2+y^2-2x+8y-8\n2 for g(x,y)=1/36\*(x-6)^2+1/16\*(y+4)^2-1\n");

printf("\nPlease choose your function: "); scanf("%d",&func);

}

if(func!=1||func!=2)

printf("You wished to exit. Thank you\n"); return 0;

}

float f\_function(float x,float y)

{

return x\*x+y\*y-2\*x+8\*y-8;

}

float g\_function(float x, float y)

{

return (pow(x-6,2)/36+pow(y+4,2)/16-1);

}

void printFunction(int func,float i,float j,float R)

{

if(func == 1)

printf("The value of f(x,y) when x = %.1f and y = %.1f is: %.1f\n\n",i,j, R);

else

printf("The value of g(x,y) when x = %.1f and y = %.1f is: %.1f\n\n",i,j, R);

return;

}