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**ANL252**

**Python for Data Analytics**

**Tutor-Marked Assignment**

**July 2021 Presentation**

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**Question (a)**

import math

**Code: Refer to Appendix A (C1)  
Screenshot: Refer to Appendix B (Figure A)**

**Question (b)**

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**Code: Refer to Appendix A (C2)  
Screenshot: Refer to Appendix B (Figure B)**

**Question (c)**

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**Code: Refer to Appendix A (C2)  
Screenshot: Refer to Appendix B (Figure B)**

**Question (d)**

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**Code: Refer to Appendix A (C3)  
Screenshot: Refer to Appendix B (Figure C)**

**Question (e)**

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**Code: Refer to Appendix A (C3)  
Screenshot: Refer to Appendix B (Figure C)**

**Question (f)**

**Code: Refer to Appendix A (C4)  
Screenshot: Refer to Appendix B (Figure D)**

**Question (g)**The while loop executes the value of the loop variable from negative infinity to K which is passed as argument to the pdf function which the values is added to dictionary. The variable become the key of the dictionary and the result of the pdf() function become the value of the key. The loop variable is incremented by the alpha value.

**Question (h)**Text

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**Code: Refer to Appendix A (C5)  
Screenshot: Refer to Appendix B (Figure E)**

**Appendix A: Codes  
  
C1.**import math

**C2.**

# To set default value for mean & variance

m = 0

v = 1

# User to input value for mean

mean = (input("Enter the value of mean between minus infinity and plus infinity: "))

# To validate user input is numeric

while mean:

if not mean.isnumeric() and mean!='':

print("Please enter a numeric value for mean! ")

mean = (input("Enter the value of mean between minus infinity and plus infinity: "))

else:

break

# To assign default value of mean if no value entered

if mean == '':

mean = float(m)

mean = float(mean)

# User to input value for variance

var = (input("Enter the value of variance larger than 0: "))

# To validate user input is numeric & larger than 0

while var:

if not var.isnumeric() and var!='':

print("Please enter a numeric value for variance!")

var = (input("Enter the value of variance larger than 0: "))

elif var.isnumeric() and float(var)<=0:

print("Please enter value larger than 0!")

var = (input ("Enter the value of variance larger than 0: "))

else:

break

# To assign default value of variance if no value entered

if var=='':

var=float(v)

var = float(var)

# User to input value for x

x = (input("Enter the value of X between minus infinity and plus infinity: "))

# To validate user input is numeric

while x:

if not x.isnumeric() and x!="":

print("Please enter a numeric value for X!")

x = (input("Enter the value of X between minus infinity and plus infinity: "))

else:

break

x = float(x)

print("Mean is", mean)

print("Variance is", var)

print("X is",x)

**C3.**

#User defined funtion for pdf

def pdf():

if x==0 and mean==0:

n = 0

d = 0

else:

n = math.exp(-((x - mean)\*\*2)/(2\*var))

d = math.sqrt(2\*math.pi\*var)

if n==0 or d==0:

fx = 0

else:

fx = n/d

fx = round(fx, 4)

# display the final value of the function

print("Probability density function is ", fx)

pdf()

**C4.**

import math

# To set default value for mean & variance

m = 0

v = 1

neg\_infty = -10.0

alpha = 0.1

# User to input value for mean

mean = (input("Enter the value of mean between minus infinity and plus infinity: "))

# To validate user input is numeric

while mean:

if not mean.isnumeric() and mean!='':

print("Please enter a numeric value for mean! ")

mean = (input("Enter the value of mean between minus infinity and plus infinity: "))

else:

break

# To assign default value of mean if no value entered

if mean == '':

mean = float(m)

mean = float(mean)

# User to input value for variance

var = (input("Enter the value of variance larger than 0: "))

# To validate user input is numeric & larger than 0

while var:

if not var.isnumeric() and var!='':

print("Please enter a numeric value for variance!")

var = (input("Enter the value of variance larger than 0: "))

elif var.isnumeric() and float(var)<=0:

print("Please enter value larger than 0!")

var = (input ("Enter the value of variance larger than 0: "))

else:

break

var = float(var)

# To assign default value of variance if no value entered

if var=='':

var=float(v)

var = float(var)

# User to input value for k

k = (input("Enter the value of k between minus infinity and plus infinity: "))

# To validate user input is numeric

while k:

if not k.isnumeric() and k!="":

print("Please enter a numeric value for k!")

x = (input("Enter the value of X between minus infinity and plus infinity: "))

else:

break

k = float(k)

mean = float(mean)

var = float(var)

print("Mean is", mean)

print("Variance is", var)

print("k is",k)

#User defined funtion for pdf

def pdf():

if k==0 and mean==0:

n = 0

d = 0

else:

n = math.exp(-((k - mean)\*\*2)/(2\*var))

d = math.sqrt(2\*math.pi\*var)

if n==0 or d==0:

fx = 0

else:

fx = n/d

fx = round(fx, 4)

k = float(k)

neg\_infty = float(neg\_infty)

print("Negative infinity value: ", neg\_infty)

alpha = float(alpha)

print("Alpha value: ", alpha)

num = neg\_infty

result = 0.0

d = dict()

while num<=k:

result += pdf(num)

result = alpha\*result

d[round(num, 4)] = round(result, 4)

num += alpha

print("Probability function is ", result)

**C5.**

import math

m = 0

s = 1

# To generate x = {-5, -4.9, -4.8, ..., 4.8, 4.9, 5}

X = [0.1\*x for x in range(-50,51)]

# Create dictionary name store

store = {}

for x in X:

# Probability of the normal distribution

p = math.exp(-1/2\*((x-m)/s)\*\*2) / (s\*math.sqrt(2\*math.pi))

store[x] = p # store the probability of x in the dictionary

# To generate x’ between -2 and 2 with a step width of 0.5

Xselect = [0.1\*x for x in range(-20,21,5)]

# display probabilities at those selected x's

for x in Xselect:

print("x = {:.2f}, p(x) = {}".format(x,store[x]))

**Appendix B: Codes Screenshot**

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Description automatically generated**Figure A.**

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**Figure C.**

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