

SHANTILAL SHAH ENGINEERING COLLEGE, BHAVNAGAR
B.E. Sem-IV (CIVIL ENGG.)-EVEN-2015 **Sub : Num. & Stat. Methods for Civil Engineering**
Tutorial:3 **Topic : Numerical Integrations**

Ex-1 State Trapezoidal rule with n=10 and evaluate (1) $\int_0^1 e^{-x^2} dx$. (2) $\int_0^1 e^x dx$.

Ex-2 Evaluate $\int_0^6 \frac{1}{1+x} dx$. taking h=1 using Simpson's $\frac{1}{3}$ rule .Hence obtain an approximate value of $\log_e 7$.

Ex-3 Evaluate $\int_0^3 \frac{1}{1+x} dx$. with n=6 using Simpson's $\frac{3}{8}$ rule and hence ,Calculate $\log_e 2$.Estimate the bound of the error involve in the process.

Ex-4 The speed v meters per second ,of a car ,t seconds after it starts,is shown in the following table

t	0	12	24	36	48	60	72	84	96	108	120
v	0	3.60	10.08	18.60	21.60	18.54	10.26	4.50	4.5	5.4	9.0

Using Simpson's $\frac{1}{3}$ rule,find the distance travelled by the car in 2 minutes.

Ex-5 A river is 80 m wide .the depth d in meters at a distance x meters from one bank is given by following table .Calculate the arc of cross-section of the river using Simpson's $\frac{1}{3}$ rule.

x	0	10	20	30	40	50	60	70	80
d	0	4	7	9	12	15	14	8	3

Ex-6 Evaluate the integral $\int_4^{5.2} \log_e x dx$ using Simpson's $\frac{3}{8}$ rule.

Ex-7 Evaluate:(1) $\int_1^3 \sin x dx$ using Gauss Quadrature of five points.

(2) $\int_0^1 e^{-x^2} dx$ by using Gauss Integration formula with n=3.

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Tutorial:4

Sub : Num. & Stat. Methods for Civil Engineering
Topic : Solution of System of Linear Equations & ODE

Ex-1 Solve the following equations using partial pivoting by Gauss-Elimination method.

$$(1) \begin{cases} x + y + z = 9, \\ 2x - 3y + 4z = 13, \\ 3x + 4y + 5z = 0. \end{cases}$$

$$(2) \begin{cases} -a + 3b - 4c = 3, \\ 3a + 2b - c = 8, \\ 2a - b + 2c = 1. \end{cases}$$

Ex-2 Solve the following equations by Gauss-Seidel method.

$$(1) \begin{cases} 27x + 6y - z = 85, \\ 6x + 5y + 2z = 72, \\ x + y + 54z = 110. \end{cases}$$

$$(2) \begin{cases} 10x + y + z = 12, \\ 2x + 10y + z = 13, \\ 2x + 2y + 10z = 14. \end{cases}$$

Ex-3 Using **Euler's method** to find: (1) $y(1.4)$ given $\frac{dy}{dx} = xy^{1/2}$, $y(1) = 1$

$$(2) y(0.2) \text{ given } \frac{dy}{dx} = y - \frac{2x}{y}, y(0) = 1$$

$$(3) y(1) \text{ given } \frac{dy}{dx} = x + y, y(0) = 1.$$

Ex-4 Using **Modified Euler's (Heun's) method** to solve $\frac{dy}{dx} = 1 - y$, $y(0) = 0$, And tabulate the solutions at $x = 0.1$ & 0.2 .

Compare the answer with Exact solution.

Ex-5 Use **second order Runge-Kutta method** to find: $y(0.2)$ given $\frac{dy}{dx} = x - y^2$, $y(0) = 1$ & $h = 0.1$.

Ex-6 Use **Fourth order Runge-Kutta method** to find:

$$(1) y(0.2) \text{ given } \frac{dy}{dx} = x + y, y(0) = 1 \text{ \& } h = 0.1.$$

$$(2) y(1.1) \text{ given } \frac{dy}{dx} = x - y, y(1) = 1 \text{ \& } h = 0.05.$$

$$(3) y(0.2) \text{ given } \frac{dy}{dx} = x^2 + y^2, y(0) = 1 \text{ \& } h = 0.1.$$

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Tutorial:5

Topic : Statistics

Ex-1 Calculate the Arithmetic Mean by the shortcut method for the following data:

X	0	1	2	3	4	5	6	7	8	9	10
f	2	8	43	133	207	260	213	120	54	9	1

Ex-2 For the following data find the mean

Class	10-19	20-29	30-39	40-49	50-59
Frequency	1	1	15	10	20

Ex-3 Define the Geometric mean and Harmonic Mean with examples.

Ex-4 Find the median of 10,15,26,30,5,11,48,44.

Ex-5 The following table gives the marks of obtained by 50 students in statics. Find the median

Marks	0-10	10-20	20-30	30-40	40-50
No. Of Students	16	12	18	3	1

Ex-6 Calculate mode for the following data

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No. Of Students	5	15	20	20	32	14	14

Ex-7 Find the standard deviation for the following data

x	5	10	15	20	25
f	7	4	6	3	5

Ex-8 Find the correlation coefficient from the following data:

X	5	6	7	8	9	10	11
Y	6	8	11	9	12	10	14

Ex-9 The scores of 10 students in their X and Y subjects are

X	2	3	4	4	5	6	6	7	7	8
Y	1	3	2	4	4	4	6	4	6	7

Find the regression line of Y on X.

Ex-1 Let A and B be any two events with $P(A)=3/8$, $P(B)=5/8$ and $P(A\cup B)=3/4$. Find $P(A/B)$ and $P(B/A)$.

Ex-2 There are 5 blue, 2 yellow and 3 red balls in the box. 3 balls are randomly selected from the box. Find the probabilities of the following events.

(a) All are of different colour

(b) All are same colour

Ex-3 A discrete random variable X has the following probability distributions :

X	0	1	2	3	4
f(X=x)	0	2k	0.1	k	0.2

(a) Find k

(b) Compute $P(X<3)$, $P(2<X<5)$

Ex-4 Define Poission Distribution .

In a company there are 350 workers. The probability of a workers remain absent on any one day is 0.03. Find the probability that on a day seven workers are absent.

Ex-5 Define the Normal Distribution. The continuous random variable z has a standard normal distribution. Calculate the probability that

(a) $z < 1.6$

(b) $z > -1.6$

Ex-6 Define Binomial Distribution.

A dice thrown 6 times. If getting an odd number is a success, find the probability of

(a) five success ,

(b) At least five success ,

(c) At most five success