

**St. Mira's College for Girls, Pune**  
 (Autonomous-Affiliated to SavitribaiPhule Pune University)

**Class: SYBSC Computer Science**

**Subject: Numerical Analysis**

**Subject Code: BS31604**

**Semester: III**

**Year: 2018-19**

1. Unit No.: 1
2. Employability/Entrepreneurship/Skill development  
Skill Development : Problem Solving, computing skills
3. Test Numerical Integration helps in problem solving and computing.

19/9/2018

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 ROLL NO - 5507  
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Supplement No. :  
 Roll No. : 1825

**St. Mira's College For Girls, Pune 1.**

Simpson's 3/8 Rule :-

Consider the quadratic equation.

$x_0$  to  $x_0+3h$

$$\int_{x_0}^{x_0+3h} y dx = h \left[ 3y_0 + \frac{3^2}{2} \Delta y_0 + \left( \frac{3^3 - 3^2}{2} \right) \frac{\Delta^2 y_0}{2!} + \left( \frac{3^4 - 3^3 + 3^2}{4} \right) \frac{\Delta^3 y_0}{3!} \right]$$

Putting  $n=3$ ,

$x_0$  to  $x_0+3h$

$$\int_{x_0}^{x_0+3h} y dx = h \left[ 3y_0 + \frac{(3)^2}{2} \Delta y_0 + \left( \frac{(3)^3 - (3)^2}{2} \right) \frac{\Delta^2 y_0}{2!} + \left( \frac{(3)^4 - (3)^3 + (3)^2}{4} \right) \frac{\Delta^3 y_0}{3!} \right]$$

$x_0$  to  $x_0+3h$

$$\int_{x_0}^{x_0+3h} y dx = h \left[ 3y_0 + \frac{9}{2} (y_1 - y_0) + \left( \frac{27 - 9}{2} \right) \frac{\Delta^2 y_0}{2!} + \left( \frac{81 - 27 + 9}{4} \right) \frac{\Delta^3 y_0}{3!} \right]$$

$x_0$  to  $x_0+3h$

$$\int_{x_0}^{x_0+3h} y dx = h \left[ 3y_0 + \frac{9}{2} (y_1 - y_0) + \left( \frac{54 - 27}{2} \right) \frac{\Delta^2 y_0}{2!} + \left( \frac{81 - 108 + 36}{4} \right) \frac{\Delta^3 y_0}{3!} \right]$$

$x_0$  to  $x_0+3h$

$$\int_{x_0}^{x_0+3h} y dx = h \left[ 3y_0 + \frac{9}{2} (y_1 - y_0) + \frac{27}{6} \Delta^2 y_0 + \frac{9}{4} \times \frac{\Delta^3 y_0}{6} \right]$$

$x_0$  to  $x_0+3h$

$$\int_{x_0}^{x_0+3h} y dx = h \left[ 3y_0 + \frac{9}{2} (y_1 - y_0) + \frac{27}{12} \Delta^2 y_0 + \frac{9}{24} \Delta^3 y_0 \right]$$


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