Title! Trapezoidal and simpson's Rules for numerical Integration OBJECTIVE TO solve numerical falegrals using trapezoidal and simpson's rules theory; 1. About Trapezoidal and simpson's rule & Keis corresponding to n= xo, no, no, --, xn which are equally spaced with step-sizeh. Then by Newhor's forward intespolation formula Jaoydn=h[n30+2 2/0+2 (n3-n2) 13/0+6(14-n3+1) 13/0 + 1 ( 1 - 3ny + 11n3 - 3n2) Dyy + by putting n=1 in above ear Newbon's - cotequandrature formula and assuming that there are only two paired value of x and y or that the interpolating polynomial is linear. Sandar = plant To + Ato ] as higher order litterenies do not exist. or, Snoydr = h [ yo + = (y1 - y0)] or, Ino y dr = 1 (40+ 11) simpson's one-hard Rule

Simpson's one-there kille By putting n=2 in Newton-cote's quadrature formula ie, assuming that there are only three paired values of x and y or assuming that there are only three paired values of x and y or that the interpolating polynomial is a second degree polynomial

[ 2 ydn = h[2 yot 2 2yot 2 (3-2) 2 yo] as \$3,70 & higher order ditterence do not exist. Smyda=h[270+2(y1-70)+ (y2-241-70)] Since D'yo = yo - 2 y 1+ y 0 Sno ydn = = (y0 - 4 yet (2) # Algorithms simple Trapezoidal Rule 1. Start 3. Input the lower limit & upper limit of integration, say a and b respectively. 4. compute the Integration as I= h/2\* (f(a)+f(b)) where, h=b-1 & f(a), f(b) are tunctional value for 5. given tunction.
5. Display the result asl
6. Stop simpson's Brule 1. Start 2. Declare the variable 3. Inpute the lower limit & upper limit of integration, say a and brespechiely 4. compute the Integration as: J=h/3\* [f(a)+4\*(f(a+b)/2)+f(b)]; where, h=(b-a)/2 and f(a), f(b) and f(a+b) are tunchional value for given function. Display the result as I. 6-Stop

composite Toapezoidal Rule 2. Declare the variable. 3. Input the lower limit and upper limit of integration, 4. compute the no ot strip required, eayn. 5. compute the width of the strip as "ha (b-a)/n. 6. compute the integration as! 2\* E + (a+i\*h) J=h/2 x [f(a)+f(b)] 7. Display the result ass 8. Stop composite simpson's 1/3 Rule 3. Input the lower limit and upper limit integration, 1. Stord ompute the no. of ship required, sayn, s. compute the width of the skip as! hack-a)/n. J=h/3\* [f(a)+4x&f(a+h)/2)+f(a+3h)+g+2\*&f(a+2h) 6. compute the Entegration as 7. where h= (b-a)/3 and f(a), f(b), f(a+h) & f(a+2h)
are functional value for a given tunction, 8. Display the result as J. g. Stop

## simpson's 3/8 Rule 1. Start 2. Declare the variable 3. Input the lower limit & upper limit of integration, in supper the no. of strip required stay and is respectively. 4. Compute the integration as I=3h/8 x [f(a) +3xf(a+h) +3xf(a+2h)+f(b)]; where, h=(b-a)/3 and f(a), f(b), f(ath) and f(a+2h) ore functional value for given function. 6. Display the result as I. 7. Stop composite simpson's 3/8 Rule 1- start 2. Declare the variable 3. Input the lower limit & appealined of integration say a and brespectively. 4. Input the no. of strip required, say n. 5. compute the Integration as J= 3h/8 \* [f(w) +3x\$ f(a+h)+(a+2h)+f(a+4h)+... + f(a+(n-1)h3+2&f(a+3h)+f(a+6h)+--, f(b)3]; where, h= (b-a)/n and f(a), f(b), f(a+h) and f(a+2h) are tunctional value for given function. 6 - Display the result as I

7. Stop

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1. Source code
1. simple trape zoidal Rule
# include < stdio h)
Hindude < math. h)
 floul f(float x)
   refurn (1+2×2×x);
  int main ()
    float a,b,h, I;
    point flienter the lower and upper number a and bi);
    scanf ("1. f 1/2 f", La, &b);
     h=(b-a);
     I = h/2 × (f(a) + f(b));
    point f(" 1= 1. f", i):
    return (o),
oulpul
enter the lower and upper number a and b! 1
                     125.500000
2. Atporition ( composite Trapezoidal Rule
# include < stdo.h)
 Hindude < math.h)
  float f(float x)
  { return (1+ x* x* x);
  infmain()
    floal a, b, h, & I, n, sum = 0; intai;
   printflienter the lower and upper variable a and bi);
   Sconf (114. f-1. f", &a, &b);
    printf(" ender the n");
    Scan + (11/1 f 11, &n);
     h=(b-a)/n;
```

```
for ( =1; 1 = n-1; 1++)
  sum = sum + f(a-tixh);
  J=h/2 x E(f(a)+f(b)+2x sum);
  print $ (" I = 1. +", I);
  return(0);
outpul!
enter lower and upper variable a and b:
                   Enfern: 4
                    1 = 4-796875
3. simpson's 1/3 Rule
# include < stoio.h>
# include < math. h)
 floch ffloch x)
  return (1+2×2×x)
 Int maine)
  è ant i;
     float a, b, h, I;
     printfolium enter lower and upper variable a andbis;
    Scanf (11-1. filef", &a, & b);
     h = (b-a)/2;
    J=(h/3) x (f(a)+4x f((a+b)/2)+f(b));
    printf(" ]=-1.f", ]);
    return (0);
oulpul!
enter lower and upper variable a and b! I
                               1=160
```

```
4. composite simpson's 1/3 Rule
Hindudezstdio.n
Hindude cmathins
 float f(floatn)
   return (1+xxxxx);
  flood
int masin()
        floal a, b, h, Rei J, sume = 0, sumo= 0;
        int ins
      print f(" enter the houses one upper voriables");
      scanf ("1.f.1.f", da, & b);
       printf("enter the no-of variables");
       scanf(" 1-d", &n),
       h=(b-a)/n;
      wite 1=2;
         while (iz=n-1)
              sum = sum e+f(a+ixh);
              1=1+2;
            3 = 17
             while (iz=n-1)
               sum on sumo + f(a+ixh);
               1=1+2;
              I=(h/3)*(f(a)+4*sumo+2*sume+f(b));
             print f(114. $11, I))
             refun 0;
       enter the lower and upper number a and b?
output!
                                               2
             Enter the no. of strips ! 4
                       I = 160
```

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                                       THERING
 simpson's 3/8 Rule
 # indudecstdio. hs
 # include < math. h
                                                      NT
 floal f(floalx)
   return (1+ 2x xxx);
 int main ()
   float arbih, I;
  print flienter the lower and upper number a and b');
  Scanf("1.f.1.f", La, 2b);
   h=(b-a)/3;
  J= (3*4/8) x (f(a)+3xf(a+h)+3xf(a+2xh)++(b));
  return(0);
for! Enter the lower and upper numbers a and b:
                J= 4.75
composite simpson's 3/8 Rule
#include < stdio.h)
# include < math. h>
. float f(floatx)&
return (1+2×2×2);
        a, b, h, I, sum = 0,1,5%;
  point fill Ender the lower and upper variable a and b");
  scanf (11 -1. f-1. f", &a, &b);
  printf(" enter the value ofn);
  Scanf (11-1- f", 8n)
  h= (b-a)/n;
   for ( i= 1; i< n; i++)
  とx=a+i×h;
    if (1-1.3==0)
        sum = sum +2 x f(x);
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else; sum = sum + 3\* f(x); J= (3+h/8) \* (f(a)+f(b)+sum); printf(" I = 1. f", I); return 0; sulpid: Enter the Johner and uppervariable a and b: 2 Enter the value of n: \$4 1 = 6.818918

MOTEUISMOS COA MOTREUSZID

From Mis lab, we learnt more about simple and composite trapezoidal and simpson's ruler we were more clear about the simpson's rule and trapezoi'dal rules formula, using c-prog