

Ejercicio

Resolver la siguiente área sobre la curva por el método de Romberg con 4 trapecios.

$$f(x)=x^3+2x^2+7x-20.$$

Limite inferior =1.

Limite Superior =1.58

Para 1 Trapecio.

NT=Numero de trapecios.

$$H= (Ls-Li)/NT= (1.58-1)/1=0.58$$

$$B=f(1)=1^3+2(1^2)+7(1)-20= -10$$

$$b=f(1.58)=1.58^3+2(1.58^2)+7(1.58)-20= -0.002888$$

$$\text{Área}= ((B+b)*H)/2=((-10-0.002888)*0.58)/2=-2.90008=2.90008$$

Para 2 Trapecios.

$$H=(1.58-1)/2=0.29$$

$$B=f(1)=1^3+2(1^2)+7(1)-20= -10$$

$$b=f(1.29)=1.29^3+2(1.29^2)+7(1.29)-20= -5.495111$$

$$\text{Área}=((10-5.495111)*0.29)/2=-2.2467=2.2467$$

$$\Sigma \text{Áreas}=0+2.2467=2.2467$$

$$B=f(1.29)=1.29^3+2(1.29^2)+7(1.29)-20= -5.495111$$

$$b=f(1.58)=1.58^3+2(1.58^2)+7(1.58)-20= -0.002888$$

$$\text{Área}=((5.495111-0.002888)*0.29)/2=-0.7972=0.7972$$

$$\Sigma \text{Áreas}=2.2467+0.7972=3.0439$$

$$\text{Área}=3.0439$$

Para 4 Trapecios.

$$H=(1.58-1)/4=0.145$$

$$B=f(1)=1^3+2(1^2)+7(1)-20= -10$$

$$b=f(1.145)=1.145^3+2(1.145^2)+7(1.145)-20= -7.8618$$

$$\text{Área}= ((-10-7.8618)*0.145)/2=-1.2949=1.2949$$

$$\Sigma\text{Áreas}=0+1.2949=1.2949$$

$$B=f(1.145)=1.145^3+2(1.145^2)+7(1.145)-20= -7.8618$$

$$b=f(1.29)=1.29^3+2(1.29^2)+7(1.29)-20= -5.4951$$

$$\text{Área}= ((-7.8618-5.4951)*0.145)/2=-0.9683=0.9683$$

$$\Sigma\text{Áreas}=1.2949+0.9683=2.2632$$

$$B=f(1.29)=1.29^3+2(1.29^2)+7(1.29)-20= -5.4951$$

$$b=f(1.435)=1.435^3+2(1.435^2)+7(1.435)-20= -2.8815$$

$$\text{Área}= ((-5.4951-2.8815)*0.145)/2=-0.60733=0.60733$$

$$\Sigma\text{Áreas}=2.2632+0.60733=2.87053$$

$$B=f(1.435)=1.435^3+2(1.435^2)+7(1.435)-20= -2.8815$$

$$b=f(1.58)=1.58^3+2(1.58^2)+7(1.58)-20= -0.002888$$

$$\text{Área}= ((-2.8815-0.002888)*0.145)/2=-0.209118=0.209118$$

$$\Sigma\text{Áreas}=2.87053+0.209118=3.079$$

$$\text{Área}=3.079$$

Aplicando el método de Romberg.

$$1=2.90008$$

$$2=3.0439$$

$$4=3.079$$

$$1-2=(4*3.0439-2.90008)/(4-1)=3.09184$$

$$2-4=(4*3.079-3.0439)/(4-1)=3.0907$$

$$1-2_{2-4} = \frac{(4^2) \cdot 3.0907 - 3.09184}{(4^2) - 1} = 3.091$$

Área Total=3.091