DEBER.

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1) Los numeros $[x_0, x_1, x_2 \ldots x_n]$ determinan una participacion P de intervalo $[a,b]$ encuentre $\Delta x_1, \Delta x_2 \ldots \Delta x_n$ y la norma de $\|P\|$ de la participación.

$[-3, 1] = [-3, -2.7, -1, 0.4, 0.9, 1]$

$\Delta x_1 = -3, 2.7 = 0.3$

$\Delta x_2 = -2,7 + 1 = 1.7$

$\Delta x_3 = -1 - 0.4 = -1.4 \quad \|P\| = 1.4$

$\Delta x_4 = 0.4 - 0.9 = -0.5$

$\Delta x_5 = 0.9 - 1 = -0.1$

2) Calcula la suma de Riemann R_P de f correspondiente a la participación uniforme $P[1,5]$ en los cuatro subintervalos determinados por $x_0 = 1 \quad x_1 = 2 \quad x_2 = 3 \quad x_3 = 4 \quad x_4 = 5$ eligiendo

a) w_k = Como el extremo derecho x_u de $[x_{u-1}, x_k]$

b) w_k = Como extremo izquierdo x_{n-1} de $[x_{k-1}, x_k]$

c) w_k = Como el punto medio de $[x_{k-1}, x_k]$

$f(x) = 3 - 4x$

$\sum_{k=1}^{n} f(w_k)\Delta \qquad \Delta x = 1 \quad \Delta x = 1 \quad \Delta x_y = 1 \quad \Delta x_u = 1$

$\frac{k-4}{13k} = \frac{5-3}{9} - \frac{5}{9} = 1$

$f(w_y) = 3 - 2(1) = -1 \times 4 = -4$

$f(w_y) = 3 - (4)(2) = -5 \times 4 = -20$

$f(w_y) = 3 - (4)(3) = -9 \times 4 = -36$

$f(w_y) = 3 - 4(4) = -13 \times 4 = -92$

$f(w_4) = 3 - 4(3) = -17 \times 4 = -68$

3) Sea $f(x) = x^3$ y P la particpación de $[-2,4]$ en los cuatros subintervalos determinantes por $x_0 = -2$ $x_1 = 0$ $x_2 = 1$ $x_3 = 3$ $x_4 = 4$ calcule la suma de Rremman R para $w_1 = -1$ $w_2 = 1$ $w_3 = 2$ $w_4 = 4$

$\Delta x_1 = 2$
$\Delta x_2 = 1$
$\Delta x_3 = 2$
$\Delta x_4 = -1$

$$\frac{b-a}{\# \text{ par}} = \frac{4-2}{4} = \frac{6}{4} = \frac{3}{2}$$

$f(w_1) = -2 = -8$
$f(w_2) = -1 = -1$
$f(w_3) = 0^3 = 0$
$f(w_4) = 1^3 = 1$
$f(w_5) = 2^3 = 8$
$f(w_6) = 3^3 = 27$
$f(w_7) = 4^3 = 64$

$$\sum_{-2}^{4} x^3 (4) = -1(4) + 1(3/2) + 8(3/1) + 64(3/2)$$

$$\sum_{-2}^{4} x^3 \Delta x = 268.$$

4) $\lim_{\|P\| \to 0} \sum_{k=1}^{n} \pi (w_0^2 - 4) \Delta x = [-1, 2]$

$$\int_{-1}^{2} \pi (w^2/8 - 4)\, dw$$

5) Suponiendo que $\int^4 \sqrt{x}\, dx = 14/3$ calcule $\int_4^1 \sqrt{x}\, dx$

$$\int_4^1 x^{1/2}\, dx = \frac{x^{3/2}}{3/2} \Big| = \frac{x^{3/2}}{3/2} - \frac{4^{3/2}}{3/2} = -14/3$$

6) Suponiendo que $\int^8 \sqrt[3]{s}\, ds = 45/4$ calcule $\int_8^{-1} \sqrt[3]{t}\, dt$

$$\int_8^{-1} t^{1/3}\, dt = \frac{t^{3/3 \cdot 1}}{2/3} \Big| = \frac{-1^{2/2}}{2/3} = \frac{8^{2/5}}{3/3} = \frac{45}{\phi}$$

7) $\int_0^3 \sqrt{9-x^2}\, dx$ $\qquad x = \frac{\sqrt{a}}{\sqrt{b}}\, sen(a) \cdot \sqrt{a-bx^2}$

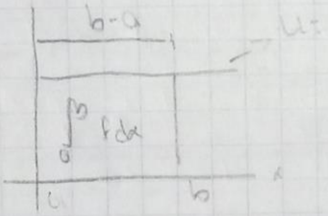
$\int \sqrt{9-sen(u)^2} \cdot 3\cos(u)\, du \; ; \; \int_0^{\pi/2} \cos^2(u)\, du$

$\int_0^{\pi/2} \cos^2(u)\, du = 9 \cdot \frac{1}{2} \left(\int_0^{\pi/2} du' \int_0^{\pi/2} \cos(2u)\, du \right.$

$9/2\, (\pi/2 + 0) = 9\pi/4$

8) Sea c un numero real arbitrario y $f(x) = c$ para todo x sea P una participación arbitraria de $[a,b]$. Demuestre que la suma de Riemann R_p de f es igual a $(b-a)$. Usando este hecho demuestre $\int_a^b dx = c(b-a)$ interprete geometricamente para el caso en que $c>0$.

$\sum_1^n f(w_i)\,\Delta x_i = \sum_i^n c\,\Delta x_i = c \sum_i^n \Delta x_i = c(b-a)$



9) $\int^3 \sqrt{9-x^2}$

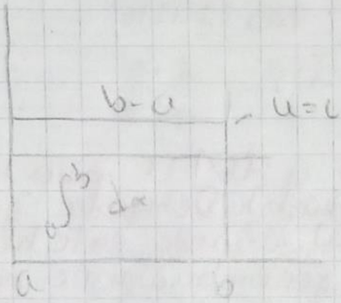
$\int \sqrt{9-(3sen(u))^2} \cdot 3\cos(u)\, du \cdot \int_0^{\pi/2} 9\cos^2(0)\, du$

$\cos^2(u)\, dx = 9/2 \left(\int_0^{\pi/2} du + \int_0^{\pi/2} \cos(2u)\, du \right.$

$9/2\, (\pi/2 + 0) = 9\pi/4$

b) Un numero real arbitrario y $f(x) = c$ para todo x y una participación arbitraria de $[a,b]$. Demuestre que lo $\int_a^b f\,dx = c(b-a)$ interprete y cometerioramente el caso en que $c \geq 0$.

$f(w)\,\Delta x_u = \sum_n c\,\Delta x_1 = c\,\Sigma u = c(b-a)$



Ejercicios 5.5

Evaluar los siguientes integrales

1. $\int (3x+1)^4\,dx \qquad u = 3+c \quad du \quad 3dx \quad \frac{du}{3}$

$(u)^4 = \frac{du}{3}$

$\frac{u^5}{5} \cdot \frac{1}{3} = \frac{u^5}{15} + = \frac{(3x+1)^5}{25} + c$

2. $\int \sqrt{t^3 - t}\;dt \qquad u = t^3 - 1 \qquad du = t^2\,dt$

$\sqrt{u}\,\frac{du}{3} = \int u^{1/2}\,\frac{du}{3} = \frac{u^{3/2}}{3/2} \cdot \frac{u^{3/2}}{3/2} \cdot \frac{1}{3} + c$

$\frac{1}{3}\,\frac{(t^3-1)^{3/2}}{3/2} + c = \frac{2}{9}\,(t^3-1)^{3/2} + c = \frac{u^{3/2}}{3/2} \cdot \frac{1}{3} + c$

3) $\int \sqrt{1-25^2}\, d_y$ $U = 1-25^2$ $du = 45\, dx$ $dx = \frac{du}{3/5}$

$\int \frac{8}{U^{1/3}} \frac{du}{-2/5} = \int U^{1/3} \cdot \frac{du}{-2} = \frac{1}{4} \cdot \frac{U^{2/3}}{2/3} + c$

$\frac{3}{8}(1+3^2)^{2/3} + c$

4) $\int \sqrt[3]{t^4-t^2}\,(10t^3-5t)\,dt$ $U = t^4 - t^2$ $du = 4t^3 \cdot 2t\, dx$

$\int \sqrt[3]{u} \cdot 5(2t^3 3) \cdot \frac{2/0}{2(2)^3 \cdot t)}$

$\frac{5}{2}\int u^{1/3}\, du = \frac{1}{3} \cdot \frac{u^{4/3}}{4/3} + c = \frac{1}{4}(t^4 - (2)^{4/3} + c$

5) $\int \frac{(\sqrt{u+3})^4}{\sqrt{u}}\, du$ $u\sqrt{u}+3$ $du = \frac{1}{2\sqrt{u}}\, du$

$\int \frac{(u)^4}{\sqrt{u}}\ 2\sqrt{u}\ 2u$

$\int (u)^4 = 2\frac{u^5}{5} = 1 \cdot \frac{(\sqrt{u}+3)^5}{5}$

6) $\int \left(1+\frac{1}{u}\right)^{-3} \cdot \left(\frac{1}{u^2}\right) du$

$u = \left(1+\frac{1}{u}\right)^3$ $u = \frac{x}{2}$

$U' = \frac{3x^2}{(x+1)^4} = \int \frac{1}{x^2}\, dx = -\frac{1}{x}$

$\left(1+\frac{1}{x}\right)^{-3}\left(-\frac{1}{3}\right) \cdot \int \frac{3x^2}{(x+1)^4}\left(-\frac{1}{2}\right) dx$

$\frac{-x^2}{(x+1)^3} - \int \frac{3x}{(x+1)^4}$

$\int \frac{3x}{(x+1)^4}\, dx \quad \frac{3x}{(x+1)^4} - \frac{1}{(x+1)^3}$

$-\frac{x^2}{(x+1)^3} - \left(\frac{3}{2(x+1)^2} - \frac{1}{(x+1)^3}\right)$

$-\frac{x^2}{(x+1)^2} - \frac{3}{3(x+1)^2} + \frac{1}{(x+2)^3} + c$

$\int (2x^2 - 3)^5 \, x \, dx \qquad u = 2x^2 - 3 \qquad du = 4x \qquad d: \frac{du}{4x}$

$\int u^5 \cdot x \frac{du}{4x} = \frac{1}{4} \int u^3 \, du = \frac{1}{4} \cdot \frac{u^6}{6} + C = \frac{1}{24} (2x^2 - 3)^6$

8) $\int 7\sqrt{9 - 7^7} \, dx \qquad u = 9 - 27 \qquad du: 2 = dx \qquad dx = \frac{du}{-2}$

$\int 7\sqrt{u} \frac{du}{-27} = \frac{1}{2} \int u^{1/2} = -\frac{1}{2} \cdot \frac{u^{3/2}}{3/2} + c = \frac{1}{3} (9 - 2x)^{3/2} + c$

9) $\int \frac{x - 2}{(x^2 - 4x + 3)} \, dx \qquad u = x^2 - 4x + 3 \qquad du = 2x - 4 \, dx$

$dx = \frac{du}{2x - 4} \qquad dx = \frac{du}{2(x-2)}$

$\int \frac{x - 2}{(u)^3} \cdot \frac{du}{2(x-2)}$

$\frac{1}{2} \int \frac{1}{u^3} \, du = \frac{1}{2} \int u^{-3} = \frac{1}{2} \cdot \frac{u^{-2}}{-2} + 1 = \frac{1}{-4} \cdot u^{-2} + c$

$-\frac{1}{4} \cdot (x^2 - 4x + 3)^{-2}$

10) $\int \frac{x^2 + x}{(4 - 9x^2 - 2x^3)^4} \, dx \qquad u = 4 - 3x^2 - 2x^3 \qquad du = -6x - 6x^2 \, dx$

$dx = \frac{du}{-6x - 6x^2}$

$dx = \frac{du}{-6(x + x^2)}$

$\int \frac{x^2 + x}{u^4} \cdot \frac{du}{-6(x + x^2)}$

$-\frac{1}{6} \int \frac{1}{u^4} \, du = -\frac{1}{6} \int u^{-4}$

$-\frac{1}{6} \cdot \frac{u^{-3}}{-3} + c \quad \frac{1}{8} u^{-3} = \frac{1}{18} (4 - 3x^2)^{-3} + c$