Doğukan Kıyıklık - 152120211104

Q1)

$$f(x) = b_0 + b_1(x - x_0) + b_2(x - x_0)(x - x_1) \dots$$

$$b_0 = f(x_0), \quad b_1 = f(x_1, x_0), \quad b_2 = f(x_2, x_1, x_0)$$

x_i	$f(x_i)$
0	13
1	11
3	16

$$\Rightarrow f(x_1, x_0) = \frac{11 - 13}{1 - 0} = -2$$

$$\Rightarrow f(x_2, x_1) = \frac{16 - 11}{3 - 1} = \frac{5}{2}$$

$$\Rightarrow f(x_2, x_1, x_0) = \frac{\frac{5}{2} - (-2)}{3 - 0} = \frac{3}{2}$$

$$b_0 = 13, \quad b_1 = -2, \quad b_2 = \frac{3}{2}$$

$$\boxed{f(x) = 13 - 2(x - 0) + \frac{3}{2}(x - 0)(x - 1)}$$

Estimated Value $\Rightarrow f(2) = 13 - 2(2 - 0) + \frac{3}{2}(2 - 0)(2 - 1)$

$$= 12$$

True Value $\Rightarrow f(2) = 13 - 2.(2) + (2)^2 = 13$

Doğukan Kışıklık - 152120211104

Q2

$$\int_a^b f(x)\,dx \Rightarrow I = (b-a)\frac{f(a)+4f\left(\frac{a+b}{2}\right)+f(b)}{6}$$

a) True Value

$$\int_1^3 (8-2x+x^2)\,dx \Rightarrow 8x - x^2 + \frac{x^3}{3} \Big|_1^3 \rightarrow \underbrace{(72-81+243)}_{234} - \underbrace{(8-1+\tfrac{1}{3})}_{7,33}$$

Cevap => 226,67

b) $\int_1^3 f(x) + \int_3^5 f(x) + \int_5^7 f(x) + \int_7^9 f(x)$

$f(1) = 7$	$f(4) = 16$	$f(7) = 43$
$f(2) = 8$	$f(5) = 23$	$f(8) = 56$
$f(3) = 11$	$f(6) = 32$	$f(9) = 71$

$(3-1)\frac{f(1)+4f(2)+f(3)}{6} = 16,66$

$(5-3)\frac{f(3)+4f(4)+f(5)}{6} = 32,66$

$(7-5)\frac{f(5)+4f(6)+f(7)}{6} = 64,66$

$(9-7)\frac{f(7)+4f(8)+f(9)}{6} = 112,66$

Σ 226,64

152120211104 - Doğukan Kıyıklık

Q3

$$\int_a^b f(x)\,dx \Rightarrow \boxed{I = (b-a)\,\frac{f(a)+f(b)}{2}}$$

a) True Value

$$\int_1^9 (8 - 2x + x^2)\,dx \Rightarrow 8x - x^2 + \frac{x^3}{3}\Big|_1^9 \Rightarrow 226,67$$

b) $\int_1^3 f(x) + \int_3^5 f(x) + \int_5^7 f(x) + \int_7^9 f(x)$

$(3-1)\cdot\frac{f(1)+f(3)}{2} \Rightarrow 18$

$(5-3)\cdot\frac{f(5)+f(3)}{2} \Rightarrow 34$

$(7-5)\cdot\frac{f(5)+f(7)}{2} \Rightarrow 66$

$(9-7)\cdot\frac{f(7)+f(9)}{2} \Rightarrow 114$

Σ 232