

2)

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 $a = 5, b = 5$ Ölüm 1

$$F(x) = x^3 + (5-5)x^2 - (5-25)x - 20$$

$$= x^3 - 20x - 20$$

 $[4,4, 5,7]$

$$a) \left. \begin{array}{l} f(4,4) = -27,216 \\ f(5,7) = 45,493 \end{array} \right\} f(4,4) \cdot f(5,7) < 0 \Rightarrow \exists \text{ kök } \Rightarrow f \text{ kök } (4,4, 5,7)$$

$$b) \text{ Çarpanların Biri: } 5, \quad \epsilon = 10^{-5}$$

$$n \geq \frac{\log(5,7-4,4) - \log(10^{-5})}{\log 2} \Rightarrow n \geq 16,38, \text{ Dn. } \text{ atanışın sonucunu } 17 \text{ Biri.}$$

Aşağıda 5 Biri için hesapları

$$x_0 = \frac{4,4 + 5,7}{2} = 5,05$$

$$\left. \begin{array}{l} F(5,05) = 2,732 > 0 \\ F(4,4) = -27,216 < 0 \end{array} \right\} \Rightarrow \text{ kök } (4,4, 5,05)$$

$$x_1 = \frac{4,4 + 5,05}{2} = 4,725$$

$$\left. \begin{array}{l} F(4,725) = -13,732 < 0 \\ F(5,05) > 0 \end{array} \right\} \Rightarrow \text{ kök } (4,725, 5,05)$$

$$H) \left. \begin{array}{l} x_2 = 5,7 - \frac{5,7-4,4}{F(5,7)-F(4,4)} \cdot F(5,7) = 4,886 \\ F(4,886) = -5,902 < 0 \\ F(5,7) > 0 \end{array} \right\} \Rightarrow \text{ kök } (4,886, 5,7)$$

$$x_2 = 5,7 - \frac{5,7-4,886}{F(5,7)-F(4,886)} \cdot F(5,7) = 4,98$$

$$\text{Sonuç: } \left| \frac{4,98 - 4,886}{4,98} \right| = 1,8\%$$

5)

$$i) g_1(x) = \frac{x^3 - 20}{21} \rightsquigarrow f(x) = 0 \Rightarrow x^3 - 21x - 20 = 0 \Rightarrow x_0 = \frac{x^3 - 20}{21} = g_1(x) \quad \checkmark$$

$$ii) g_2(x) = x^3 - 20x - 20 \rightsquigarrow f(x) = 0 \Rightarrow x^3 - 21x - 20 + x = x \Rightarrow x = x^3 - 20x - 20 \quad \checkmark$$

$$iii) g_3(x) = \frac{x + x^3 - 20}{-21} \rightsquigarrow f_3(x) = x \Rightarrow x^3 - 21x - 20 + x = x \Rightarrow x^3 - 20 = 0 \neq f(x) \quad \times$$

$$\text{Ölüm } f(x) = 0 \Rightarrow g(x) = x$$

X noktası

2)

Ergebnis ergibt, $x_0 = 2,5, 4$

$$\Rightarrow x_1 = y_1(t_0) = \frac{5,4^3 - 20}{21} = \underline{\underline{6,545}}$$

$$x_2 = g_1(t_1) = \frac{6,545^3 - 20}{21} = \underline{\underline{12,39}}$$

$$x_3 = g_1(x_2) = \frac{12,333 - 20}{21} = \underline{\underline{89,8}}$$

14 $g_1(x)$ ist regulär zu einem anderen $g_2(x)$

f) Na_2O_2 , u H_2O avner iver jeifere SO_2 og pulver stætte, ~~u~~
~~og~~ ~~stætte~~ ~~stætte~~. Måske ude av SO_2 og H_2O i Na_2O_2 , H_2O , H_2O
u. H_2O og pulver

Quiz 2

a) 3 орбіта - 200 балів налічує:

$$3) p_{2t}^{(k)} = y_0 z_0^{(k)} + y_1 z_1^{(k)} + y_2 z_2^{(k)} \quad (1)$$

$$L_0(x) = \frac{(x-2)(x-5)}{(1-2)(1-5)} = \frac{x^2 - 7x + 10}{4}, \quad y_0 = 15$$

$$L_2(x) = \frac{(x-1)(x-5)}{(2-1)(2-5)} = \frac{x^2 - 6x + 5}{-3}, \quad y_1 = 25$$

$$b_2(x) = \frac{(x-1)(x-2)}{(5-1)(5-2)} = \frac{x^2 - 3x + 2}{12}, y_2 = 50$$

$$\Rightarrow p_{22}(k) = \dots$$

$$\text{II)} \quad p_{2N}(t) = a_0 + a_1(t-t_0) + a_2(t-t_0)(t-t_1)$$

$$\begin{array}{l}
 x_0 = 1 \quad f(x_0) = 15 \\
 x_1 = 2 \quad f(x_1) = 25 \\
 x_2 = 5 \quad f(x_2) = 50 \\
 x_3 = 6 \quad f(x_3) = 130 \\
 x_4 = 7 \quad f(x_4) = 150
 \end{array}
 \left[\begin{array}{l}
 f(x_1, x_0) = \frac{25 - 15}{2 - 1} = 10 \\
 f(x_2, x_1) = \frac{50 - 25}{5 - 2} = 8,33 \\
 f(x_3, x_2) = \frac{130 - 50}{6 - 5} = 80 \\
 f(x_4, x_3) = \frac{150 - 130}{7 - 6} = 20
 \end{array} \right]
 \left[\begin{array}{l}
 f(x_2, x_1, x_0) = \frac{8,33 - 10}{5 - 2} = -0,33 \\
 f(x_3, x_2, x_1) = \frac{80 - 8,33}{6 - 2} = 17,91 \\
 f(x_4, x_3, x_2) = \frac{20 - 80}{7 - 2} = -12
 \end{array} \right]
 \left[\begin{array}{l}
 f(x_3, \dots, x_0) = \frac{17,91 - 0,33}{6 - 1} = 3,416 \\
 f(x_4, \dots, x_1) = \frac{-12 - 17,91}{7 - 2} = -5,982
 \end{array} \right]$$

$$\rightarrow \frac{f(x_4, x_3, x_2, x_1, x_0)}{7-1} = \frac{-5,982 - 3,416}{7-1} = -1,566$$

$$\text{Aşağıdaki } p_{2N}(x) = 15 + 5(x-1) + 0,83(x-1)(x-2) = 15 + 5(x-1) + 0,83(x^2 - 3x + 2) = 0,83x^2 + 2,51x + 11,66$$

To nel/ho Lagrange din valgittene fixe tilas per omuettia xevaa. And
in Omuettia avettivvuu va neettivvuu (ilo va to p₂₀(x) car din ipuu jiuu
laou auu neettivvuu), uuuuuu, uuuuuu neettivvuu inu nel/ho Omuettia u (auu 2)
neettivvuu auu nel/ho Omuettia (auu 3).

b) $20 \text{ hr} \cdot \frac{24 \text{ hr}}{24 \text{ hr}} \cdot \frac{1 \text{ d}}{24 \text{ hr}} = 0,416 \text{ days}$

$p_{2N}(4,416) = p_{2L}(4,416) = 38,93$ mha² ist also
unverändert bei der Verdoppelung der Fläche $F(5) > F(4,416) > F(2)$

3)

f) S onpina - 4ov baQpin noj/po

$$p_N(x) = a_0 + a_1(x-x_0) + a_2(x-x_0)(x-x_1) + a_3(x-x_0)(x-x_1)(x-x_2) + a_4(x-x_0)(x-x_1)(x-x_2)(x-x_3)$$

$$p_{4N}(x) = p_{2N}(x) + 3,416(x-1)(x-2)(x-5) - 1,566(x-1)(x-2)(x-5)(x-6)$$

$$= p_{2N}(x) + 3,416(x^3 - 8x^2 + 17x - 10) - 1,566(x^3 - 8x^2 + 17x - 10)(x-6)$$

$$\Rightarrow p_{4N}(x) = 0,83x^2 + 2,51x + 11,66 + 3,416(x^3 - 8x^2 + 17x - 10) - 1,566(x^3 - 8x^2 + 17x - 10)(x-6)$$

$$= 0,83x^2 + 2,51x + 11,66 + 3,416x^3 - 27,328x^2 + 58,072x - 34,16 - 1,566(x^3 - 8x^2 + 17x - 10)(x-6)$$

ka cimeveta xevav Sov utuljtmav

Da ammaravimav m mni y = 200 so p4N(x) nam

ba wamr wa nos x, to ualava pocompovim vido

~~(long, short, and other things)~~
(low, med, other new new cind)

To avizitova civa kineis avibmas pni m mni m,
f(x) civa cni, so pvara (adulav, davarav, mni

To x avizitav va pcomvH avia ppublivo so S

4)

a) Ques 30 $y(h) = \frac{S}{A \cdot B^h} \rightarrow \ln y = \ln \frac{S}{A \cdot B^h} \Rightarrow y = \frac{A \cdot B^h}{S}$

h	y	h ²
0	20	0
1	15	1
2	11,5	4
5	2,5	25

$\sum h = 8, \sum h^2 = 30$

~~relogio~~

$\Rightarrow \ln y = \ln(A \cdot B^h) - \ln S$

$\Rightarrow \ln y = \ln A + \ln B^h - \ln S$

$= \ln A + h \ln B - \ln S$
 $\downarrow$
 $= x \cdot 0 + a$

$\frac{1}{y}$	$\ln(1/y)$	$h \cdot (\ln(1/y))$
0,05	-2,99	-0,149
0,066	-3,71	-0,178
0,087	-2,44	-0,212
0,133	-3,017	-0,261

Summa

$4 \cdot (\ln A/S) + \sum h \cdot \ln B = \sum \ln y (= \sum \ln(1/y))$

$\sum h \cdot (\ln A/S) + \sum h^2 \cdot \ln B = \sum h \cdot \ln y$

$\rightarrow \begin{cases} 4(\ln A/S) + 8 \ln B = -10,157 \\ 8 \cdot (\ln A/S) + 30 \ln B = -0,807 \end{cases} \Rightarrow \begin{cases} 30 \ln B - 16 \ln B = -9,807 + 2 \cdot 10,157 \\ 14 \ln B = 21,121 \end{cases}$

$\Rightarrow \ln B = 1,508$

$\rightarrow \ln(A/S) = \frac{-0,807 - 30 \cdot 1,508}{8} = -5,55$

$\Rightarrow B = e^{1,508} = 4,517$

$\Rightarrow \ln A = \ln S + 5,55 = -3,944$

$\Rightarrow A = e^{-3,944} = 0,019$

area $y(h) = \frac{S}{0,019 \cdot 4,517^h} = \frac{258,12}{4,517^h}$

Marafii rum illen avalepa, u xarion mas varrichu, nali deoim, (M-T) rum u adaliozom i-odas pa rizeu u o-epengum, (cum, nreuparum uarom adaliozom u nreuparum). Ta nreuparum saderum oimom sivar "Siderum" u r, u nreuparum u nali deoim u nreuparum u nreuparum.

pa pte $h=1,8 \rightarrow y(1,8) = \frac{258,12}{4,517^{1,8}} = 17^{\circ}C$

b) 5) on eke avalepa rum bupie rum nali deoim. Au sivar 3u bupie da rum nali deoim, av rum bupie ≥ 4 ($n=4$) da saderum rum nali deoim.

II) av aze zo adlo rum 3u bupie rum nali deoim, uar da nreuparum saderum uar nali deoim. Au sivar bupie ≥ 4 o i-odas da da sivar nreuparum saderum nali deoim.

III) der nreuparum rum nali deoim Lagrange i Newton uar rum saderum nali deoim nreuparum uar saderum, uar nali deoim "nali deoim" uar nali deoim uar nali deoim uar nali deoim.

5)

Grunds. zu Splines sind Splines in einem 2. oder 3. Grades (Kurve) oder in einem von Funktionen)

Übung 40 $[4, 6]$ Quadrat

$$s(x) = \begin{cases} p_0(x) = 1 + A(x-4) + B(x-4)^2, & x \in [4, 5] \\ p_1(x) = 2 + \Gamma(x-5)^2 + \Delta(x-5)^3, & x \in [5, 6] \end{cases}$$

$$a) \quad p_0'(x) = A + 2B(x-4) \quad , \quad p_0^{(4)}(5) = p_1(x)5$$

$$p_1'(x) = 2\Gamma(x-5) + 3\Delta(x-5)^2$$

$$p_0''(x) = 2B$$

$$p_1''(x) = 2\Gamma + 6\Delta(x-5)$$

5.2. Kontinuität an den Knoten:

$$p_0'(5) = p_1'(5) \Rightarrow A + 2B = 0 \Rightarrow \underline{A = -2B}$$

$$p_0''(5) = p_1''(5) \Rightarrow 2B = 2\Gamma \Rightarrow \underline{B = \Gamma}$$

$$\text{Quadrat} \rightarrow p_0''(4) = 0 \Rightarrow 2B = 0 \Rightarrow \underline{B = \Gamma = 0 = A}$$

$$p_1''(6) = 0 \Rightarrow 4\Delta = 0 \Rightarrow \underline{\Delta = 0}, \text{ also } A, B, \Gamma, \Delta = 0$$

$$b) \quad x_0 = 4, \quad x_1 = 5, \quad x_2 = 6$$

1. a 2. Bsp. $[4, 6]$ beide sind 2. a):

$$s(x) = \begin{cases} 1, & x \in [4, 5] \\ 2, & x \in [5, 6] \end{cases} \quad , \quad \text{also } f(5-\frac{1}{2}) = 1$$

$$f) \quad f'(5+\frac{1}{2}) = 0 \quad \text{mit } f_1'(x) = 0 \quad \forall x \in [5, 6]$$

$\in [5, 6]$