Teknisk matematik d-c Facitliste

Indhold

1. Tal og symboler

1.01 –

1.02 –

1.03 a) $2a - 2b + 6$ b) $12a - 2b - 2c$ c) $2ac - 2ad + 3bc - 3bd - 3a + 3c + 2b + 2d$

1.04 a) - b) $-3a - b$

1.05 a) $10a$ $b)4d - 6c$ c) $e - 9f$

1.06 a) $2 - b$ b) $6 - 2a$ c) -5

1.07 a) 10 b) -5248 c) -3027

1.08 a) $7ab - 9b^2$ b) $-3a$ c) $-1 - 3a + 2d - ad$

1.09 a) $4a^2 + 9b^2$ b) $75c^2 + 49d^2$ c) $-201e^2 - 626f^2 - 158ef$

1.10 a) $(6x - 9y)^2$ b) $(4a - 3b)(4a + 3b)$ c) $(7c + 2d)^2$

1.11 a) $\frac{23}{24}$ b) $\frac{8a+9b}{6}$ c) $\frac{12d+37c}{15}$

1.12 a) $\frac{19}{12x}$ b) $\frac{14x}{15y}$ c) $\frac{12x-7y}{6y}$

1.13 a) $0{,}04$ b) $0{,}04$ c) $-0{,}04$ d) $0{,}008$ e) $-0{,}008$ f) $-0{,}008$

1.14 a) -4 b) 0 c) -54

1.15 –

1.16 a) $1{,}6430\ m^2$ b) $16.430\ cm^2$ c) $1.643.000\ mm^2$

1.17 –

1.18 a) $a^{\frac{3}{4}}$ b) $b^{\frac{5}{4}}$ c) $c^{\frac{1}{5}}$ d) $(x+1)^{\frac{1}{2}}$ e) $(x+1)^{\frac{2}{3}}$ f) $(x+1)^{-\frac{2}{3}}$

1.19 a) -99.75 b) 2 c) $278{,}03$

1.20 $1328\ mm$

1.21 $x = 14\ mm$

1.22 $b = 8\ mm$

1.23 $0{,}4\ m$

1.24 –

1.25 –

2. Ligninger og uligheder

2.01 a) $x = 8$ b) $x = 10$ c) $x = 4$

2.02 a) - b) $x = -\frac{2}{3}$

2.03 a) $x = 5$ b) $x = 2$ c) $x = 2$

2.04 $b = 60\ mm$

2.05 $R = 4{,}62\ ohm$

2.06 $t_2 = 103{,}33°\mathrm{C}$

2.07 $n = 1593\ omdr/minut$

2.08 a) $v = \frac{\pi \cdot d \cdot L \cdot i}{1000 \cdot t \cdot s}$ b) $d = \frac{1000 \cdot t \cdot v \cdot s}{\pi \cdot L \cdot i}$ c) $s = \frac{\pi \cdot d \cdot L \cdot i}{1000 \cdot t \cdot v}$

2.09 a) $m = \frac{2a}{z_1 + z_2}$ b) $z_1 = \frac{2a - mz_2}{m}$ c) $z_2 = \frac{2a - mz_1}{m}$

2.10 $92\ kg, 108\ kg$

2.11 55,56,57,58

2.12 30

2.13 -1

2.14 $98{,}28\ kr.$

2.15 27,08 %

2.16 5,41 %

2.17 a) $B = 20{,}83$ b) $C = 21{,}23$ c) $D = 21{,}63$ d) $E = 21{,}43$ e) $F = 21{,}98$ f) $G = 22{,}14$

2.18 a) $x = 5\ og\ y = 2$ b) $x = 3\ og\ y = 2$ c) $x = 1{,}33\ og\ y = 6$

2.19 $145, 215$

2.20 14,78

2.21 5,10

2.22 a) $x = 0\ eller\ x = 3{,}5$ b) $x = 0\ eller\ x = 2{,}33$ c) $x = 0\ eller\ x = 5{,}33$

2.23 a) $x = \pm 10$ b) $x = \pm 8$ c) $x = \pm 2$

2.24 a) $x = -1\ eller\ x = -0{,}667$ b) $x = 0{,}33$ c) $Ingen\ løsning$

2.25 a) $x = 15\ og\ y = 12\ eller\ x = 12\ og\ y = 15$

2.26 $x = 6$

2.27 $x = 13\ og\ y = 7\ eller\ x = 7\ og\ y = 13$

2.28 a) $x = 3\ og\ y = -1\ eller\ x = -0{,}2\ og\ y = 1{,}4$

b) $x = 3{,}5\ og\ y = -5{,}5\ eller\ x = -0{,}1\ og\ y = 1{,}7$

c) $x = 1\ og\ y = 6\ eller\ x = 8\ og\ y = 3$

2.29 a) $x > 5{,}5$ b) $x < -1$ c) $x < \frac{1}{15}$

2.30 $Stigning = 52{,}8\ m$

2.31 a) $Fald = 1{,}139\ \%$ $2 = 15{,}335$ $3 = 15{,}734$ $4 = 16{,}133$ $5 = 16{,}532$

c) $2a = 15{,}615$ $2b = 15{,}895$ $2c = 16{,}175$ $4a = 16{,}413$ $4b = 16{,}693$ $4c = 16{,}973$

$6a = 17{,}210$ $6b = 17{,}490$ $6c = 17{,}770$

2.32 $H = 18\ cm, L = 24\ cm$

2.33 a) $14x + 6y = 78\ og\ 10x + 8y = 78$ b) $x = 3\ cm\ og\ y = 6\ cm$

c) $Areal_1 = 234\ cm^2, Areal_2 = 252\ cm^2$

3. Geometri

3.01 a) $65°, 155°$ b) $24°, 114°$ c) $8°, 98°$ d) $-,70°$

3.02 $Lille\ viser: 0{,}5°/minut$ $Store\ viser: 6°/minut$

3.03 a) $90°$ b) $150°$ c) $50°$

3.04 $b = 4{,}19\ cm$

3.05 $v = 256{,}8°$

3.06 $Areal = 202{,}69\ cm^2$

3.07 $R = 9{,}83\ cm$

3.08 $Areal = 6{,}18\ cm^2$

3.09 $v = 46{,}32°$

3.10 a) $A\ og\ C$ b) $Modstående\ side\ er\ c, hosliggende\ sider\ er\ a\ og\ b$

3.11 $72{,}45\ cm$

3.12 $1{,}29\ m, 1{,}93\ m, 2{,}58\ m$

3.13 $28{,}28\ cm$

3.14 $52{,}1°$

3.15 $67°$

3.16 $22{,}5°, 67{,}5°$

3.17 $4°, 44°, 132°$

3.18 $339{,}41\ m^2$

3.19 $93{,}84\ m^2$

3.20 $90.000\ liter$

3.21 $V = 27\ cm^3, A = 54\ cm^2$

3.22 2,49

3.23 $V = 18\ m^3$

3.24 a) $12{,}7\ cm$ b) $678\ cm^2$

3.25 $752\ kg$

3.26 a) $213\ cm^3$ b) $236\ cm^2$

3.27 a) $135{,}13\ cm^2$ b) $183{,}26\ cm^3$

3.28 a) $224{,}5\ cm^3$ b) $176\ cm^2$ c) $v = 103°$

3.29 a) $45{,}05°$ b) $84{,}5°$ c) $129{,}54°$

3.30 $Areal = 273{,}7\ mm^2$

3.31 $AB = 3{,}33\ meter$

3.32 a) $45\ emner$ b) $49{,}5\%$ c) $31\ emner$ d)$69{,}95\%$

3.33 a) $16{,}73\ m$ b) $114{,}64\ m^2$

3.34 a) $137.500.000\ m^3$ b) $100.000.000\ m^3$

4. Trigonometri

4.01 –

4.02 –

4.03 a) - b) - c) - d) $x = 7{,}47°, y = 83{,}68°, z = 67{,}38°$ e) –

4.04 a) $B = 42{,}7°, a = 3{,}90\ cm, b = 3{,}60\ cm$ b) $A = 42{,}7°, a = 16{,}24\ cm, c = 23{,}95\ cm$

c) $A = 53{,}6°, B = 36{,}4°, a = 5{,}15\ cm$

4.05 a) $A = 53{,}84°°, C = 36{,}16°, b = 22{,}85\ cm$ b) $C = 36{,}6°, a = 7{,}63\ cm, c = 5{,}66\ cm$

c) $A = 28{,}61°, C = 61{,}39°, b = 12{,}53\ cm$

4.06 a) - b) $c = 8{,}06\ cm, A = 29{,}74°, B = 60{,}26°$ c) $m_a = 6{,}08\ cm$ d) $v_B = 4{,}51\ cm$

e) $h_c = 3{,}28\ cm$ f) –

4.07 a) - b) $r = 2{,}44\ cm, t = 5{,}48\ cm, T = 66°$ c) $v_T = 2{,}91\ cm$ d) $h_s = 2{,}23\ cm$

e) $m_r = 5{,}61\ cm$ f) –

4.08 a) $v_1 = 16{,}64°, v_2 = 163{,}36°$ b) $v_1 = 38{,}43°, v_2 = 141{,}57°$ c) $v_1 = 60{,}96°, v_2 = 119{,}04°$

4.09 –

4.10 a) $B = 42{,}2°, C = 67{,}8°, c = 6{,}9\ cm$ b) $C = 96{,}1°, c = 18{,}4\ cm, b = 12{,}47\ cm$

c) $Løsning\ 1: B = 43{,}9°, A = 115{,}8°, a = 6{,}48\ cm$ $Løsning\ 2: B = 136{,}1°, A = 23{,}6°, a = 2{,}88\ cm$

4.11 –

4.12 a) $A = 70{,}9°, B = 49{,}1°, c = 9{,}17\ cm$ b) $B = 26{,}2°, C = 33{,}8°, a = 9{,}03\ cm$

c) $A = 49{,}2°, B = 62{,}3°, C = 68{,}5°$

4.13 a) $B = 71{,}01°, C = 42{,}39°, a = 4{,}46\ cm, c = 3{,}28\ cm$

b) $Løsning\ 1: A = 108{,}9°, C = 29{,}5°, b = 4{,}77\ cm, c = 3{,}54\ cm$

$Løsning\ 2: A = 21{,}08°, C = 117{,}32°, b = 12{,}55\ cm, c = 16{,}80\ cm$

c) $A = 33{,}28°, C = 88{,}72°, a = 4{,}25\ cm, b = 6{,}57\ cm, c = 7{,}74\ cm$

4.14 a) $Areal = 9{,}6\ cm^2, R = 5{,}6\ cm, r = 1\ cm$ b) $Areal = 43{,}8\ cm^2$ c) $Areal = 20{,}91\ cm^2$ d) –

4.15 $31{,}34\ m$

4.16 $v = 9{,}5°$

4.17 $x = 30{,}9\ mm$

4.18 $s = 24\ mm$

4.19 $a = 1{,}8\ mm, b = 6{,}5\ mm$

4.20 $94{,}73\ cm$

4.21 $a = 11{,}55\ mm$

4.22 $a = 2{,}01\ m, b = 2{,}84\ m, c = 3{,}92\ m$

4.23 $a = 2{,}40\ m, b = 4{,}50\ m$

4.24 $L = 90{,}55\ mm$

4.25 $d = 152\ mm$

4.26 $h = 46\ mm$

4.27 $d = 4{,}64\ cm$

4.28

	1	2	3	4	5	6	7	8	9	10
x	80	118,11	58	41,89	102	195,91	223,62	179,91	168,2	211,91
y	108	130	146,11	86	69,89	76,94	92,94	104,65	60,94	49,23

4.29 $R = 164\ N, a = 27{,}6°$

4.30 $Areal = 465{,}9\ mm^2$

4.31 $a_1 = 23{,}2\ mm, a_2 = 37{,}8\ mm, b_1 = 5\ mm, b_2 = 13{,}8\ mm$

4.32 $a = 196{,}67\ mm$

5. Funktioner

5.01 a) - b) $A(4{,}2), B(7; 3{,}5), C(7{,}2)$ c) $A = 26{,}57°, B = 63{,}43°, C = 90°$ d) $Areal = 2{,}25$

5.02 a) - b) $A(0{,}0), B(-5{,}10), C(-5, -4), D(-1, -4)$

c) $A = 139{,}39°, B = 26{,}57°, C = 90°, D = 104{,}04°$ d) $Areal = 43$

5.03 a) $(3{,}15)$ b) $(2{,}0)$ c) $(-0{,}17; 3{,}20)$

5.04 a) - b) $A(2{,}1), B(6{,}3), C(6, -1), D(4, -1)$ c) $Areal = 10$

5.05 $v = 24{,}78°$

5.06 $v = 80{,}13°$

5.07 $A = 18{,}43°, B = 45°, C = 116{,}57°$

5.08 a) $y = 0{,}5x - 3$ b) $y = 2x - 6$ c) $y = -0{,}25x + 9$

5.09 a) $y = 0{,}29x - 3{,}14$ b) $y = 0{,}133x$ c) $y = 0{,}89x + 2{,}05$

5.10 a) $(0, -4)$ b) $(4{,}0)$ c) $(4, -2)$ d) $(0{,}8)$ e) $(-8{,}0)$ f)$(-8{,}1)$

5.11 $f(x) = 0{,}1389(x + 4)^2 + 5$

5.12 $f(x) = -0{,}1944(x + 4)^2 + 5$

5.13 1: a) $x = -1{,}40, (-1{,}40; 20{,}25)$ b) $(0; 18{,}29)$ c) $(-5{,}9; 0), (3{,}1; 0)$

2: a) $x = 4, (4, -3)$ b) $(0,45)$ c) $(3,0), (5,0)$

3: a) $x = 1, (1; 12,5)$ b) $(0; 10,5)$ c) $(-1,5; 0), (3,5; 0)$

5.14 a) - b) $(0, -2), (1,0), (0,2), (-5,45; 0), (1,46; 0), (1,21; 0,46)$ c) $(-13,21; -28,42)$

5.15 a) $x = 2,3219$ b) $x = 0,3219$ c) $x = 2,0792$

5.16 B$eregningen\ giver\ L_{1-2} =$
$99,97\ dB, hvilket\ må\ anses\ for\ rimeligt\ i\ forhold\ til\ den\ målte\ værdi.$

5.17 $L_{A,eq} = 88,26\ dB(a) < 90\ dB(a)$

5.18 a) $f(x) = 5,2 \cdot 0,4^x$ b) $f(x) = 5 \cdot 2^x$ c) $f(x) = 2,5 \cdot 4^x$ d) $f(x) = 75,31 \cdot 0,6518^x$

5.19 –

5.20 a) $f(x) = 6 \cdot 0,5^x$ b) $T_{\frac{1}{2}} = 1$

5.21 $f(x) = 41,01 \cdot 0,8409^x$

5.22 a) $K_1 = 5075\ kr.,\ \ K_5 = 5386,42\ kr.,\ \ K_{10} = 5802,70\ kr.$

b) $K_1 = 5125\ kr.,\ \ K_5 = 5657,04\ kr.,\ \ K_{10} = 6400,42\ kr.$

c) $K_1 = 5200\ kr.,\ \ K_5 = 6083,26\ kr.,\ \ K_{10} = 7401,22\ kr.$

5.23 $K = 16920,98\ kr.$

5.24 a) $x = 20\ cm$ b) $V = 40.000\ cm^3$

5.25 $x = 100\ m, y = 63,67\ m$

5.26 $a = 4\ m, b = 2,5\ m$

5.27 $Stængerne\ nummereres\ fra\ venstre$: $1 = 15,00\ m, 2 = 12,48\ m, 3 = 10,52\ m, 4 = 9,12\ m$

$5 = 8,28\ m, 6 = 8,00\ m, 7 = 8,28\ m, 8 = 9,12\ m, 9 = 19,52\ m, 10 = 12,48\ m, 11 = 15,00\ m$

$12 = 19,08\ m, 13 = 21,72\ m$

5.28 a) $14\ m$ b) $28,71\ sek.$ c) $10\ m$ d) $25\ sek.$

5.29 a) $9804,87\ kg$ b) $20,07\ timer$ c) $T_{\frac{1}{2}} = 34,31$ d) $t = 237\ timer$

5.30 –