Valda uppgifter i kursboken Matematik M2c av Sjunnesson med flera utgiven på Liber, (2011).

Kapitel 1

1113. a) $1.4x - \frac{2}{5} \cdot (5 + 3.5x) = 1.4x - \left(2 + \frac{7}{5}x\right) = 1.4x - 2 - 1.4x = -2$

b) $1.5(2x - y) - (x - 0.6y) \cdot 3 = 3x - 1.5y - (3x - 1.8y) = 0.3y$

1114. a) $\frac{2}{3}(9 - 3x + 2y) - \left(\frac{y}{3} - \frac{x}{4} + 0.5\right) \cdot 4 = 6 - 2x + \frac{4}{3}y - \left(\frac{4}{3}y - x + 2\right) = 4 - x$

b) $4 - x = 4 - (-5) = 4 + 5 = 9$

1115. a) $C = A - B = 3 - 5x - (x + 3) = 3 - 5x - x - 3 = -6x$

b) $C = 2B - 3A = 2(x + 3) - 3(3 - 5x) = 2x + 6 - 9 + 15x = 17x - 3$

c) $C = 3B - Ax = 3(x + 3) - (3 - 5x)x = 3x + 9 - 3x + 5x^2 = 9 + 5x^2$

1116. a) $\frac{x}{2} - \frac{3x}{2} + \frac{5x}{2} - \frac{7x}{2} + \frac{9x}{2} = \frac{x-3x+5x-7x+9x}{2} = \frac{5x}{2}$
b) $\frac{5x}{2} = \frac{5 \cdot 16}{2} = 40$ c) $\frac{5x}{2} = \frac{5}{2} \cdot \left(-\frac{2}{15}\right) = -\frac{1}{3}$

1117. $\frac{7-2x}{3} - \frac{5-2x}{3} = \frac{7-2x-(5-2x)}{3} = \frac{7-2x-5+2x}{3} = \frac{2}{3}$

1118. a) $\bar{x} = \frac{1}{4}\left(2x + 9 + 13 + x + 3(x - 8) + 2(1 + x)\right) = \frac{1}{4}8x = 2x$
b) $\bar{x} = 2 \cdot 9.5 = 19$ c) $\bar{x} = -2 \cdot \frac{3}{8} = -\frac{3}{4}$

1119. a) $\sqrt{3}\left(\sqrt{12} + \sqrt{3}\right) = \left(\sqrt{3}\sqrt{12} + \sqrt{3}\sqrt{3}\right) = \sqrt{3 \cdot 12} + 3 = \sqrt{36} + 3 = 9$

b) $\sqrt{2}\left(\sqrt{8} - \sqrt{18}\right) = \left(\sqrt{2}\sqrt{8} - \sqrt{2}\sqrt{18}\right) = \sqrt{16} - \sqrt{36} = 4 - 6 = -2$

1120. $1 + x(2 - x) \cdot x - x^2(1 - x) = 1 + x^2(2 - x) - x^2(1 - x) =$

$$= 1 + (2x^2 - x^3) - (x^2 - x^3) = 1 + x^2 > 0$$

1140. a)

$$9 - \frac{3(4x - 2)}{5} = \frac{2 + x}{10}$$

förläng med 10:

$$90 - 6(4x - 2) = 2 + x \Rightarrow 90 - 24x + 12 = 2 + x \Rightarrow 100 = 25x \Rightarrow x = 4$$

b)

$$\frac{6y-2}{5}-\frac{4y-2}{3}=1-\frac{8+y}{6}$$

förläng med 30:

$$30\cdot\frac{6y-2}{5}-30\cdot\frac{4y-2}{3}=30\cdot\left(1-\frac{8+y}{6}\right)$$

$$6\cdot(6y-2)-10\cdot(4y-2)=30-5(8+y)$$

$$36y-12-(40y-20)=30-(40+5y)$$

$$36y-12-40y+20=30-40-5y$$

$$8-4y=-10-5y\Rightarrow y=-18$$

1142. $\begin{cases} J=2\cdot E \\ M=J+4 \\ E+J+M=64 \end{cases}\Rightarrow\begin{cases} J=2\cdot E \\ M=2E+4 \\ E+2E+2E+4=64 \end{cases}\Rightarrow 5E=60\Rightarrow M=28$ år

1143. $\frac{x+2}{3x+6}=\frac{1}{3}\Rightarrow\frac{x+2}{3(x+2)}=\frac{1}{3}$ gäller för alla *x* utom $x=-2$.

1144. a) $\frac{1}{6}=\frac{2}{x-1}\Rightarrow x-1=12\Rightarrow x=13$

b) $\frac{3}{x-2}=\frac{2}{x+1}\Rightarrow 3(x+1)=2(x-2)\Rightarrow x=-7$

1145. $\frac{x}{25+x}=0.02\Rightarrow x=0.5+0.02x\Rightarrow 0.98x=0.5\Rightarrow x=\frac{0.5}{0.98}\approx 5.1$ dl

1146. $\frac{1}{6}=\frac{2}{3-x^2}\Rightarrow 3-x^2=12\Rightarrow x^2=-9$ dvs inga reella rötter.

1213.

$$3-(x-7)(2x+6)=3-(2x^2+6x-14x-42)=$$

$$=3-2x^2-6x+14x+42=45+8x-2x^2$$

1214.

$$(x+y+2)(3+x)-(x-y)(-3-x)=(x+y+2)(3+x)+(x-y)(3+x)=$$

$$=\big(x+y+2+(x-y)\big)(3+x)=(2+2x)(3+x)=6+8x+2x^2$$

1215. Kalla sidorna *x*, *y*, *u* och *z* analogt med problem 1212. Då gäller:

$$\begin{cases} xy=117 \\ uy=135 \\ xz=156 \end{cases}\Rightarrow uz=\frac{135}{y}\cdot\frac{156}{x}=\frac{135\cdot 156}{117}=180\ \text{m}^2$$

1228. a)

$$(x+h)^3-(x-h)^3=x^3+3x^2h+3xh^2+h^3-(x^3-3x^2h+3xh^2-h^3)=$$

$$=x^3+3x^2h+3xh^2+h^3-x^3+3x^2h-3xh^2+h^3=6x^2h+2h^3$$

b)

$$(x+2)^3-(x+2)^2-(x-2)=$$

$$=x^3+3x^2 2+3x2^2+2^3-(x^2+4x+4)-(x-2)=$$

$$=x^3+6x^2+12x+8-x^2-4x-4-x+2=$$

$$=x^3+5x^2+7x+6$$

1229 a) $\left(\sqrt{2x}+\sqrt{4.5x}\right)^2=2x+2\sqrt{2x}\sqrt{4.5x}+4.5x=6.5x+2\cdot 3x=12.5x$

b) $\left(\sqrt{20x}-x\sqrt{5x}\right)^2=20x-2\sqrt{20x}\cdot x\sqrt{5x}+x^2 5x=20x-2x10x+x^2 5x=$
$=20x-20x^2+5x^3$

c) $(5^{3x}-5^{0.5x})^2=5^{6x}-2\cdot 5^{3x}5^{0.5x}+5^x=5^{6x}-2\cdot 5^{3.5x}+5^x$

d) $\left(\frac{a+1}{2}\right)^2-\left(\frac{a-1}{2}\right)^2=\frac{a^2+2a+1}{4}-\frac{a^2-2a+1}{4}=\frac{a^2+2a+1-a^2+2a-1}{4}=a$

1230. Hela den stora kvadraten = 4 gula plus den röda. Eller matematiskt uttryckt:

$$c^2=4\frac{ab}{2}+(a-b)^2=2ab+a^2-2ab+b^2=a^2+b^2$$

1243.

$$\begin{cases}a-b=5\\a^2-b^2=195\end{cases}\Rightarrow\begin{cases}a-b=5\\(a+b)(a-b)=195\end{cases}\Rightarrow\begin{cases}a-b=5\\(a+b)5=195\end{cases}\Rightarrow\begin{cases}a-b=5\\a+b=39\end{cases}$$

$$\Rightarrow\begin{cases}a=22\\b=17\end{cases}$$

1254.

$$(x+3)^2+8(3-x)^2=43-(5+3x)(5-3x)$$

$$(x^2+6x+9)+8(9-6x+x^2)=43-(25-9x^2)$$

$$x^2+6x+9+72-48x+8x^2=43-25+9x^2$$

$$9x^2+81-42x=18+9x^2\Rightarrow 63=42x\Rightarrow x=\frac{63}{42}=\frac{3}{2}=1.5$$

1255. $(3x+4)^2-(4-3x)^2=(2x+3)^2-(3-2x)^2$

$(9x^2+24x+16)-(16-24x+9x^2)=(4x^2+12x+9)-(4x^2-12x+9)$

$48x=24x\Rightarrow x=0$

1256. $x^2 + x + 19 = (x+3)^2 = x^2 + 6x + 9 \Rightarrow 5x = 10 \Rightarrow x = 2$

1257. $5^2 + x^2 = (10-x)^2 = 100 - 20x + x^2 \Rightarrow 20x = 75 \Rightarrow x = \frac{15}{4} = 3.75$ cm

1258. a) $14^2 + (35-x)^2 = (35+x)^2 \Rightarrow 196 - 70x = 70x \Rightarrow x = \frac{196}{140} = \frac{14 \cdot 14}{10 \cdot 14} = 1.4$ cm
Svar: Konens höjd är 33.6 cm

b) $V_{kon} = \frac{bh}{3} = \frac{33.6}{3}\pi 14^2 \approx 7$ liter

1312. Fall 1: 15 är en katet och 4*x* är hypotenusa.

$15^2 + 4x^2 = 16x^2 \Rightarrow 12x^2 = 225 \Rightarrow x = \sqrt{\frac{225}{12}} \approx 4.3$ cm

Svar: 2*x*= 8.7 cm

Fall 2: 4*x* är en katet och 15 är hypotenusa.

$15^2 = 4x^2 + 16x^2 \Rightarrow 20x^2 = 225 \Rightarrow x = \sqrt{\frac{225}{20}} \approx 3.4$ cm

Svar: 2*x*= 6.7 cm

1313. a) $\frac{x}{3} = \frac{27}{x} \Rightarrow x^2 = 81 \Rightarrow x = \pm 9$

b) $3x = \left(\sqrt{x}+3\right)\left(\sqrt{x}-3\right) + 10 = x - 9 + 10 = x + 1 \Rightarrow 2x = 1 \Rightarrow x = 0.5$

1314. $\frac{3x-2}{x-1} = \frac{x-1}{x} \Rightarrow (3x-2)x = (x-1)^2 \Rightarrow$
$3x^2 - 2x = x^2 - 2x + 1 \Rightarrow 2x^2 = 1 \Rightarrow x^2 = \frac{1}{2} \Rightarrow x = \pm\frac{1}{\sqrt{2}} = \pm\sqrt{0.5}$

1315. $(x+a)^2 = (2a-3x)^2 \Rightarrow \begin{cases} x + a = 2a - 3x \\ x + a = -2a + 3x \end{cases} \Rightarrow \begin{cases} 4x = a \\ 2x = 3a \end{cases}$
$\Rightarrow \begin{cases} x_1 = \frac{a}{4} = 0.25a \\ x_2 = \frac{3a}{2} = 1.5a \end{cases}$

1316. $(x-a)^2 = 16 \Rightarrow x - a = \pm 4 \Rightarrow \begin{cases} x_1 = a + 4 \\ x_2 = a - 4 \end{cases} \Rightarrow \begin{cases} 6 = a + 4 \\ x_2 = a - 4 \end{cases} \Rightarrow \begin{cases} a = 2 \\ x_2 = -2 \end{cases}$
Svaret i bokens facit är underligt.

1322.

$$(x+6)^2 + x^2 = 20^2 \Rightarrow x^2 + 12x + 36 + x^2 = 400 \Rightarrow 2x^2 + 12x - 364 = 0 \Rightarrow$$

$$x^2 + 6x - 182 = 0 \Rightarrow x = -3 \pm \sqrt{9 + 182} \approx -3 \pm 13.8 = 10.8 \text{ cm}$$

$$A_{\triangle} = \frac{10.8(10.8+6)}{2} \approx 91 \text{ cm}^2$$

1323. $y^4 - 10y^2 + 9 = 0 \Rightarrow y^2 = 5 \pm \sqrt{25 - 9} = 5 \pm 4 = \begin{cases} y_1^2 = 9 \\ y_2^2 = 1 \end{cases} \Rightarrow \begin{cases} y_1 = \pm 3 \\ y_2 = \pm 1 \end{cases}$

1338. $(x + 1)(x - 3) = 0 \Rightarrow x^2 - 3x + x - 3 = 0 \Rightarrow x^2 - 2x - 3 = 0$

1339. $1.2 = 0.0001x^2 - 0.016x + 1.34 \Rightarrow 0.0001x^2 - 0.016x + 0.14 = 0 \Rightarrow$

$$x^2 - 160x + 1400 = 0 \Rightarrow x = 80 \pm \sqrt{80^2 - 1400} \approx 150 \text{ km/h}$$

1340. a) $x^4 - 13x^2 + 36 = 0 \Rightarrow x^2 = 6.5 \pm \sqrt{6.5^2 - 36} = 6.5 \pm 2.5 = \begin{cases} 9 \\ 4 \end{cases} \Rightarrow$
$x^2 = \begin{cases} 9 \\ 4 \end{cases} \Rightarrow x = \begin{cases} \pm 3 \\ \pm 2 \end{cases}$
b) $x - 5\sqrt{x} + 4 = 0 \Rightarrow \sqrt{x} = 2.5 \pm \sqrt{2.5^2 - 4} = \begin{cases} 4 \\ 1 \end{cases} \Rightarrow x = \begin{cases} 16 \\ 1 \end{cases}$

1341. a) $ax^2 + bx + c = 0 \Rightarrow x^2 + \frac{b}{a}x + \frac{c}{a} = 0 \Rightarrow p = \frac{b}{a}$ och $q = \frac{c}{a}$
b) $x = -\frac{p}{2} \pm \sqrt{\left(\frac{p}{2}\right)^2 - q} = -\frac{b}{2a} \pm \sqrt{\left(\frac{b}{2a}\right)^2 - \frac{c}{a}} = -\frac{b}{2a} \pm \sqrt{\frac{b^2}{4a^2} - \frac{4ac}{4a^2}}$

$$x = -\frac{b}{2a} \pm \sqrt{\frac{b^2 - 4ac}{4a^2}} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \text{ VSB}$$

1352. a) $a = 5 \cdot 6, b = -11 \Rightarrow x^2 - 11x + 30 = 0$

b) $\begin{cases} r_1 = -\frac{p}{2} + \sqrt{\frac{p^2}{4} - q} \\ r_2 = -\frac{p}{2} - \sqrt{\frac{p^2}{4} - q} \end{cases} \Rightarrow \begin{cases} r_1 + r_2 = -\frac{p}{2} + \sqrt{\frac{p^2}{4} - q} - \frac{p}{2} - \sqrt{\frac{p^2}{4} - q} \\ r_1 r_2 = \left(-\frac{p}{2} + \sqrt{\frac{p^2}{4} - q}\right)\left(-\frac{p}{2} - \sqrt{\frac{p^2}{4} - q}\right) \end{cases}$

$$\begin{cases} r_1 + r_2 = -p \\ r_1 r_2 = \frac{p^2}{4} - \left(\frac{p^2}{4} - q\right) = q \end{cases}$$

1362. a)

n	1	2	3	4	5	6	7	8	9	10	11	12
i^n	i	-1	-i	1	i	-1	-i	1	i	-1	-i	1

b) $i^n = 1$ när n är delbart med 4.
c) $i^{87} + i^{4001} = i^{84+3} + i^{4000+1} = i^3 + i^1 = -i + i = 0$

1363.

$2z^2 + 2(4-2i)z - 16i = 0 \Rightarrow z^2 + (4-2i)z - 8i = 0$

$$z = -\frac{4-2i}{2} \pm \sqrt{\left(\frac{4-2i}{2}\right)^2 + 8i} = i - 2 \pm \sqrt{\frac{16-16i-4}{4} + 8i} =$$

$$= i - 2 \pm \sqrt{3 - 4i + 8i} = i - 2 \pm \sqrt{3+4i} = i - 2 \pm (2+i) = \begin{cases} 2i \\ -4 \end{cases}$$

1364. $z_1 = -\frac{p}{2} + \sqrt{\frac{p^2}{4} - q}$, $z_2 = -\frac{p}{2} - \sqrt{\frac{p^2}{4} - q}$, $z_1 + z_2 = -p = 12$,
$z_1 = a + bi$ och $z_2 = a - bi \Rightarrow z_1 + z_2 = 2a = 12 \Rightarrow a = 6$

Då rötterna är komplexa måste:

$$\frac{p^2}{4} - q < 0 \Rightarrow \frac{12^2}{4} - q < 0 \Rightarrow 36 - q < 0 \Rightarrow q > 36$$

1370. a) $\sqrt{3-x} = -x - 9 \Rightarrow 3 - x = x^2 + 18x + 81$

$$\Rightarrow x^2 + 19x + 78 = 0 \Rightarrow x = -9.5 \pm \sqrt{9.5^2 - 78} = -9.5 \pm 3.5 = \begin{cases} x_1 = -6 \\ x_2 = -13 \end{cases}$$

Test: $\begin{cases} \sqrt{3-(-6)} = -(-6) - 9 \\ \sqrt{3-(-13)} = -(-13) - 9 \end{cases} \Rightarrow \begin{cases} \sqrt{9} = -3 \text{ NEJ, falsk rot!} \\ \sqrt{16} = 4 \text{ Stämmer!} \end{cases}$

b) $\sqrt{x^2 + \sqrt{20x+70}} = x + 2 \Rightarrow x^2 + \sqrt{20x+70} = x^2 + 4x + 4 \Rightarrow$

$$\Rightarrow \sqrt{20x+70} = 4x + 4 \Rightarrow 20x + 70 = 16x^2 + 32x + 16 \Rightarrow$$

$$\Rightarrow 16x^2 + 12x - 54 = 0 \Rightarrow x^2 + \frac{3}{4}x - \frac{27}{8} = 0 \Rightarrow x = -\frac{3}{8} \pm \sqrt{\left(\frac{3}{8}\right)^2 + \frac{27}{8}}$$

$$\Rightarrow x = -\frac{3}{8} \pm \sqrt{\frac{225}{64}} = \frac{-3 \pm 15}{8} = \begin{cases} x_1 = \frac{3}{2} \text{ Riktig rot!} \\ x_2 = -\frac{9}{4} \text{falsk rot.} \end{cases}$$

1371. A. $\sqrt{2x+5} = x + 1 \Rightarrow 2x + 5 = x^2 + 2x + 1 \Rightarrow x = \pm 2$ men -2 är en falsk rot.

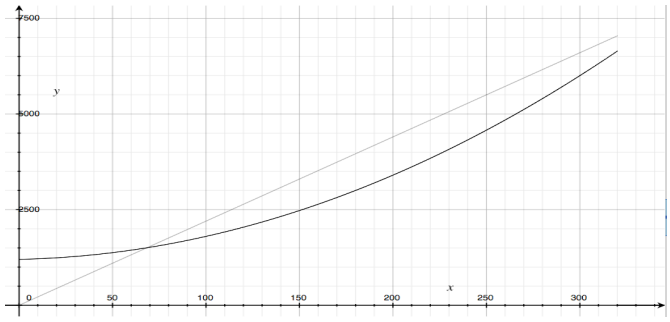
B. $\sqrt{2x+5} = -(x+1) \Rightarrow$ Bara $x = -2$ är lösning.

C. $2x + 5 = (x+1)^2 \Rightarrow x = \pm 2$ båda är riktiga rötter.

1381.
a) $6000 = 1200 + x + 0.05x^2 \Rightarrow x^2 + 20x - 96000 = 0 \Rightarrow$

$x = -10 \pm \sqrt{100 + 96000} = 300$ st (den negativa roten stryks)

b) $22x = 1200 + x + 0.05x^2 \Rightarrow x^2 - 420x + 24000 = 0$
x
$= 210 \pm \sqrt{210^2 - 24000} = \begin{cases} 68 \text{ flaskor} \\ 352 \end{cases}$ (utanför definitionsmängden)



1382.
$\begin{cases} a + b = 51 \\ ab = 144 \end{cases} \Rightarrow a + \frac{144}{a} = 51 \Rightarrow a^2 - 51a + 144 = 0 \Rightarrow a = 25.5 \pm \sqrt{25.5^2 - 144}$

$$a = 25.5 \pm 22.5 = \begin{cases} 48 \\ 3 \end{cases} \Rightarrow \begin{cases} a_1 = 48 \\ b_1 = 3 \end{cases} \text{ eller } \begin{cases} a_2 = 3 \\ b_2 = 48 \end{cases}$$

1383. $h = r + 16, 105 = 2\pi r^2 + 2\pi r(r + 16) = 2\pi r^2 + 2\pi r^2 + 2\pi r16 \Rightarrow$

$$4\pi r^2 + 2\pi r16 - 105 = 0 \Rightarrow r^2 + \frac{2\pi 16}{4\pi} r - \frac{105}{4\pi} = 0 \Rightarrow r^2 + 8r - \frac{105}{4\pi} = 0 \Rightarrow$$

$$r = -4 \pm \sqrt{16 + \frac{105}{4\pi}} = 9.4 \text{ mm}$$

1384. Den lilla delen, 1-x, förhåller sig till den stora som den stora till det hela.
$\frac{1 - x}{x} = \frac{x}{1} \Rightarrow 1 - x = x^2 \Rightarrow x^2 + x - 1 = 0 \Rightarrow x = -\frac{1}{2} \pm \sqrt{\left(\frac{1}{2}\right)^2 + 1}$
$\Rightarrow x = -\frac{1}{2} \pm \sqrt{\frac{1 + 4}{4}} = \{\text{ignorera den negativa lösningen}\} = \frac{\sqrt{5} - 1}{2}$
1412. a) $x^3 - 81x = x(x^2 - 81) = x(x + 9)(x - 9)$

b) $4(x + 2)(x + 7) - 8(x + 2)(2x + 3) = 4(x + 2)\big((x + 7) - 2(2x + 3)\big) =$

$$= 4(x + 2)(x + 7 - 4x - 6) = 4(x + 2)(1 - 3x)$$

c) $(x+3)^2-9y^2=(x+3-3y)(x+3+3y)$

d) $b^{3n}-b^n=b^n(b^{2n}-1)=b^n(b^n+1)(b^n-1)$

1424. $x^2+a=0\Rightarrow(x+7)(x-7)=x^2-49\Rightarrow a=-49$

1425. $x^{80}-1=(x^{40}+1)(x^{40}-1)=(x^{40}+1)(x^{20}+1)(x^{20}-1)=$

$=(x^{40}+1)(x^{20}+1)(x^{20}-1)=(x^{40}+1)(x^{20}+1)(x^{10}+1)(x^{10}-1)=$

$=(x^{40}+1)(x^{20}+1)(x^{10}+1)(x^5+1)(x^5-1)$

1439. $z^5-za^4=z(z^4-a^4)=z(z^2+a^2)(z^2-a^2)=z(z^2+a^2)(z+a)(z-a)$

$$=z(z^2+49)(z+7)(z-7)\Rightarrow z=0,z=\pm7 \text{ och } z=\pm7i$$

1440. $f(3)=3a(3+a)=12\Rightarrow a^2+3a-4=0\Rightarrow a=-1.5\pm\sqrt{2.25+4}=\begin{cases}-4\\1\end{cases}$

$$f(x)=\begin{cases}-4x(x-4)=0\Rightarrow x_1=0,x_2=4\\x(x+1)=0\Rightarrow x_3=0,x_4=-1\end{cases}$$

Blandade uppgifter i kapitel 1

32. $(x-2)(x^8-81)=(x-2)(x^4+9)(x^4-9)=(x-2)(x^4+9)(x^2+3)(x^2-3)\Rightarrow$

$$x_1x_2x_3=2\left(-\sqrt{3}\right)\sqrt{3}=-6$$

33. Standard: $x^2+\left(\frac{4}{3}\right)^2x^2=28^2\Rightarrow\frac{25}{9}x^2=28^2\Rightarrow x=\sqrt{\frac{9\cdot28^2}{25}}\Rightarrow A=\frac{4}{3}\frac{9\cdot28^2}{25}\approx376\text{ tum}^2$

Bredbild: $y^2+\left(\frac{16}{9}\right)^2y^2=28^2\Rightarrow\frac{337}{81}y^2=28^2\Rightarrow y=\sqrt{\frac{81\cdot28^2}{337}}\Rightarrow A=\frac{16}{9}\frac{81\cdot28^2}{337}\approx335\text{ tum}^2$

34. a) $x\cdot1.25x=x+1.25x\Rightarrow x\cdot1.25=2.25\Rightarrow x=1.8$ och 2.25

b) $4x\cdot5x=2x\cdot3x+4046\Rightarrow14x^2=4046\Rightarrow x=17$
Talen är: 34, 51, 68, 85 dvs summan är 238.

35. $x(32-x)+(x+2)(30-x)=510$

$$32x-x^2-x^2+28x+60=510\Rightarrow x^2-30x+225=0$$

$$x=15\pm\sqrt{15^2-225}=15\text{ cm}$$

36.

$$(x+1)^3 = x^3+1 \Rightarrow x^3+3x^2+3x+1 = x^3+1 \Rightarrow 3x(x+1) = 0 \Rightarrow \begin{cases} x_1 = 0 \\ x_2 = -1 \end{cases}$$

37. $(x+a)(x-4) = a(x-2) \Rightarrow x^2-4x+ax-4a = ax-2a \Rightarrow$

$$x^2-4x-2a = 0 \Rightarrow x = 2 \pm \sqrt{4+2a} \Rightarrow a = -2 \text{ ger dubbelrot}$$

38. $(x+2+3y)^2-(x+3y)^2 = (x+2+3y+x+3y)\big(x+2+3y-(x+3y)\big) =$

$$= (2x+2+6y)(x+2+3y-x-3y) = 2(x+1+3y)2$$

Är jämnt delbart med 4 om *x* och *y* är hela tal.

40. $ax^2+25a = 3x \Rightarrow\ x^2-\frac{3}{a}3x+25 = 0 \Rightarrow x = \frac{3}{2a} \pm \sqrt{\frac{9}{4a^2}-25} \Rightarrow \frac{9}{4a^2}-25 < 0$
$\Rightarrow \frac{9}{4a^2} < 25 \Rightarrow \frac{9}{100} < a^2 \Rightarrow \frac{3}{10} < |a|$

42. $x^2-15ax+9 = 0 \Rightarrow x = 7.5a \pm \sqrt{(7.5a)^2-9} \Rightarrow (7.5a)^2-9 > 0 \Rightarrow$

$$(7.5a)^2 > 9 \Rightarrow a^2 > 0.16 \Rightarrow |a| > 0.4$$

43. $(x^2-2x)^{1/2} = \sqrt{x^2-2x} = \sqrt{-5} \Rightarrow x^2-2x+5 = 0 \Rightarrow x = 1 \pm \sqrt{1-5} \Rightarrow$

$$x = 1 \pm \sqrt{-4} = 1 \pm 2i \Rightarrow (1+2i)^2+(1-2i)^2 = 1+4i-4+1-4i-4 =$$

$$= 1-4+1-4 = -6$$

44. $x_1^2+x_2^2 = 45$ och $\frac{1}{x_1}+\frac{1}{x_2} = \frac{x_1+x_2}{x_1x_2} = \frac{1}{2} \Rightarrow 4(x_1+x_2) = 2x_1x_2 \Rightarrow$

$$x_1^2+x_2^2+2x_1x_2 = 45+4(x_1+x_2) \Rightarrow (x_1+x_2)^2 = 45+4(x_1+x_2)$$

$$\Rightarrow (-p)^2 = 45+4(-p) \Rightarrow p^2+4p-45 = 0 \Rightarrow p = -2 \pm \sqrt{4+45}$$

$$\Rightarrow p = -2 \pm 7 = \begin{cases} 5 \\ -9 \end{cases} \text{och } -4p = \{\text{se uppgift 1352}\} = 2q \Rightarrow q = -2p = \begin{cases} -10 \\ 18 \end{cases}$$

$$x^2+5x-10 = 0 \text{ eller } x^2-9x+18 = 0$$

45. Kalle får 1 ± 3 med $q_{fel} \Rightarrow p_{rätt} = -2$
Pelle får -1 ∓ 2 med p_{fel}.
Använder vi Pelles svar för att hitta $q_{rätt}$ fås:

$$4 = \left(\frac{-2}{2}\right)^2 - q_{rätt} \Rightarrow q_{rätt} = -3 \text{ Svar: } x^2-2x-3 = 0$$