1 $a=5,\ b=6,\ \gamma=29°$

a) $c^2=a^2+b^2-2ab\cos\gamma$

$c=\sqrt{5^2+6^2-2\cdot5\cdot6\cdot\cos29°}\doteq2,9194$

b) $b=\sqrt{3,7^2+1,4^2-2\cdot3,7\cdot1,4\cdot\cos\ldots}$

$\doteq2,7315$

c) $a=\sqrt{2+18-2\cdot\sqrt{36}\cdot\frac{1}{2}}$

$=\sqrt{20-6}=\sqrt{14}$

d) $13^2=c^2+7^2-2\cdot7\cdot c\cdot\cos70°$

$c^2-14\cos70°\cdot c-120=0$

$c_{1,2}=\frac{14\cos70°\pm\sqrt{14^2\cos^270°+480}}{2}$

$+\doteq13,6072$

$-\doteq-8,8189$ záporné ✗

e) $5^2=a^2+11^2-2a\cdot11\cdot\cos25°$

$a^2-22\cos25°+96=0$

$a_1=\frac{22\cos25°+\sqrt{(22\cos25°)^2-384}}{2}\doteq8,1286$

$a_2=\frac{+}{2}\doteq11,8102$ obě vyhovují

f) $2^2=a^2+13^2-2\cdot a\cdot13\cdot\cos40°$

$a^2-26\cos40°\,a+\underbrace{13^2-2^2}_{165}=0$

$D=(26\cos40°)^2-4\cdot165<0$

nemá řešení.

2 a)

$\alpha=\arccos\left(\frac{b^2+c^2-a^2}{2bc}\right)$

$\beta=\arccos\left(\frac{a^2+c^2-b^2}{2ac}\right)$

$\gamma=\arccos\left(\frac{a^2+b^2-c^2}{2ab}\right)$

3 $a=5,\ \beta=55°,\ \gamma=65°$

a) $\Rightarrow\alpha=60°$

$b=a\cdot\frac{\sin\beta}{\sin\alpha}\doteq4,7294\qquad c=a\cdot\frac{\sin\gamma}{\sin\alpha}\doteq5,2326$

b) $b=\sqrt{\ldots-2\cdot\ldots\cdot\cos40°}$

$\doteq3,2104$

$\beta=\arcsin\ldots$

3 a) $a=b\cdot\frac{\sin\alpha}{\sin\beta}$

$3\cdot\frac{\sin53°}{\sin19°}\doteq7,3591$

b) $a=c\cdot\frac{\sin\alpha}{\sin\gamma}=43,137\cdot\frac{\sin111°52'18''}{\sin46°13'13''}$

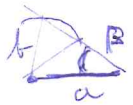
$\doteq55,4456$

c) $a=b\cdot\frac{\sin\alpha}{\sin\beta}=3\cdot\frac{\frac{\sqrt2}{2}}{\frac{\sqrt3}{2}}=3\cdot\frac{\sqrt2}{\sqrt3}=\sqrt2\cdot\sqrt3=\sqrt6$

d) $\alpha+\beta=188°>180°$

jinak $a=c\cdot\frac{\sin\alpha}{\sin\gamma}\doteq5,73<6$ ✓

4 (a) $\sin\alpha = \frac{a}{b}\cdot\sin\beta$



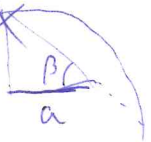
$\alpha_1 = \arcsin\left(\frac{5}{4}\sin 47°\right) \doteq 66°5'29''$

$a > b$ $\quad \alpha_2 = 180° - \alpha_1 \doteq 113°54'31''$

obz. $> \beta$ ✓ $\quad$ „sSu"

(b) $\alpha_1 \doteq \arcsin\left(\frac{5}{6}\sin 47°\right) \doteq 37°33'2'' < \beta$ ✓

$a < b$ $\quad \alpha_2 = 180° - \alpha_1 \doteq 143° > \beta$ ✗



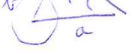
„Ssu"

(c) $\alpha_1 \doteq \arcsin\left(\frac{2}{7}\sin 47°\right) \doteq 12°3'41''$

„Ssu" $\quad \alpha_2 \doteq 180° - \alpha_1 > \beta$

$a < b$

(d) $\sin\alpha = \frac{7}{2}\cdot\sin 47° \doteq 2{,}56 > 1$

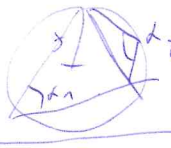


(e) $\alpha_1 \doteq \arcsin\left(\frac{5}{2}\sin 160°\right) \doteq 58°46'$

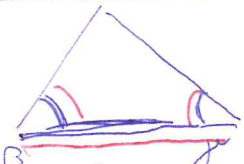
β nejv. úhel $\Rightarrow b$ nejdelší strana ↯

5 $\frac{a}{\sin\alpha} = 2r$ $\quad \alpha_1 \doteq \arcsin\frac{7}{10} \doteq 44°26'\ldots$

$\sin\alpha = \frac{a}{2r} = \frac{7}{10}$ $\quad \alpha_2 = 180° - \alpha_1 \doteq 135°34'\ldots$



6 (a)

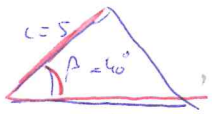


$\alpha = 180° - \beta - \gamma = 60°$

$b = a\frac{\sin\beta}{\sin\alpha} \doteq 4{,}7244$ $\quad c = a\cdot\frac{\sin\gamma}{\sin\alpha} \doteq 5{,}2326$

„usu"

(b)



„sus"

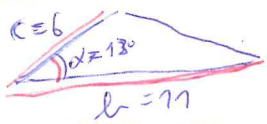
$b = \sqrt{a^2+c^2-2ac\cos\beta} \doteq 3{,}2184$

$\alpha = \arcsin\left(\frac{a}{b}\cdot\sin\beta\right) \doteq 53°1'26''$

druhý výsl. $\doteq 127°$ moc velký (γ musí být nejm.)

$\gamma \doteq 180° - \alpha - \beta \doteq 86°5'34''$

(c)



„sus"

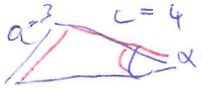
$a = \sqrt{b^2+c^2-2bc\cos\alpha} \doteq 5{,}3276$

$\beta \doteq \arcsin\left(\frac{b}{a}\sin\alpha\right) \doteq 27°$ (moc malé – γ by bylo větší!)

$= 180° - \arcsin(\quad) \doteq 152°19'28''$

$\gamma \doteq 180° - \alpha - \beta \doteq 14°40'32''$

(d)



„sSu"

$\gamma_1 = \arcsin\left(\frac{c}{a}\sin\alpha\right) \doteq 41°49'37''$

$\rightarrow \beta_1 = 180° - \alpha - \gamma_1 \doteq 108°11'23°$

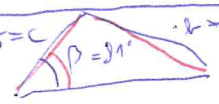
$b = a\frac{\sin\beta_1}{\sin\alpha} = 3\frac{\sin\beta_1}{\sin 30°} \doteq 5{,}7002$

$\gamma_2 = 180° - \arcsin\left(\frac{c}{a}\sin\alpha\right) \doteq 138°11'23''$

$\rightarrow \beta_2 \doteq 180° - \alpha - \gamma_2 \doteq 11°48'37''$

$b = a\frac{\sin\beta_2}{\sin\alpha} \doteq 1{,}2208$

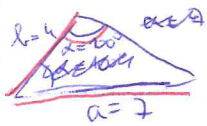
(e)



„sSu"

$\sin\gamma = \frac{c}{b}\cdot\sin\beta \doteq 1{,}18 > 1$ ↯

(f)



„sSu"

$\beta \doteq \arcsin\left(\frac{b}{a}\sin\alpha\right) = \arcsin\left(\frac{4}{7}\sin 100°\right)$

$\doteq 34°14'46''$

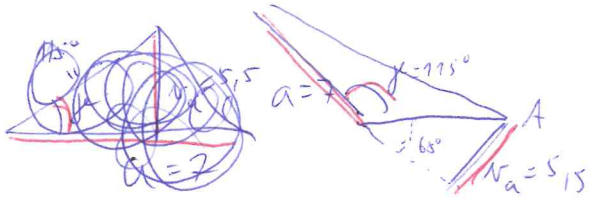
(druhé řeš. moc velké)

$\gamma = 180° - \alpha - \beta = 45°45'14''$

$c = a\frac{\sin\gamma}{\sin\alpha} = 7\frac{\sin(\downarrow)}{\sin 100°} \doteq 5{,}0918$

6)

g)



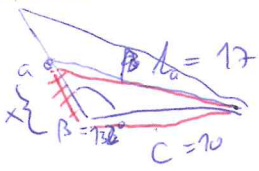
$l = \frac{v_a}{\sin 65°} \doteq 6,0686$

$c = \sqrt{a^2 + l^2 - 2al\cos\gamma} \doteq$ 11,0333

$\alpha = \arcsin\left(\frac{a}{c}\sin\gamma\right) \doteq 35°5'59''$ druhé řeš. moc velké

$\beta = 180° - \alpha - \gamma \doteq 29°54'1''$

h)



$17^2 - 10^2$ ↓

$x^2 - 20\cos 132° x - 189 = 0$

$v_a^2 = c^2 + x^2 - 2cx\cos\beta$

$x = \frac{20\cos 132° + \sqrt{(20\cos 132°)^2 + 4\cdot 189}}{2} \doteq 8,5983$

(řešení s − záporné)

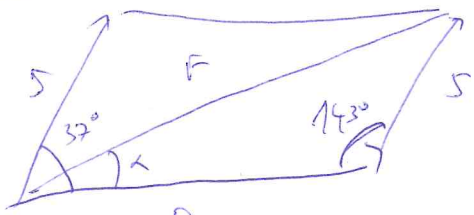
$a = 2x \doteq 17,1967$

$l = \sqrt{a^2 + c^2 - 2ac\cos\beta} \doteq 25,0773$

$\alpha = \arcsin\left(\frac{a}{b}\sin\beta\right) = 30°43'10''$

$\gamma = 180° - \alpha - \beta \doteq 17°16'50''$

7



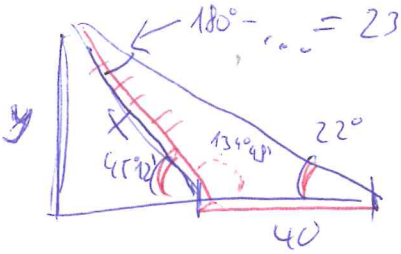
8

$F = \sqrt{8^2 + 5^2 - 2\cdot 5\cdot 8\cdot\cos 143°} \doteq 12,3649\ N$

$\alpha = \arcsin\left(\frac{5}{F}\sin 143°\right) \doteq 14°5'5''$

(druhé moc velké)

9)

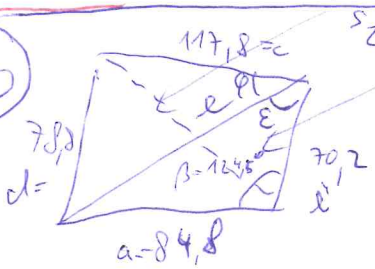


$\frac{x}{\sin 22°} = \frac{40}{\sin 28°12'}$

$x = 40\,\frac{\sin 22°}{\sin(28°12')} \doteq 38,0367$

$y = x\cdot\sin(45°12') \doteq 26,9898$

10)



$e = \sqrt{a^2 + d^2 - 2ad\cos\beta} \doteq 137,3413$

$\varepsilon = \arcsin\left(\frac{a}{e}\sin\beta\right) \doteq 30°35'14''$

$\varphi = \arccos\left(\frac{c^2 + e^2 - d^2}{2cd}\right) \doteq 34°55'30''$

$f = \sqrt{b^2 + c^2 - 2bc\cos(\varepsilon + \varphi)} \doteq 109,3134\ m$

$S = s_2 + s_1 \doteq 7084,2233$

$s_2 \doteq 4631,2282$ $s_1 \doteq 2452,9951$