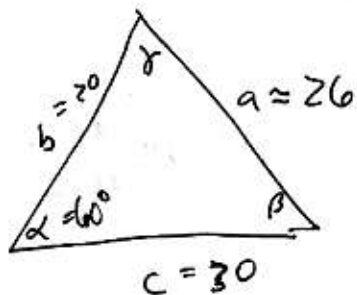


HW 17 Solution
Math 143

Section 8.2

- (3) (a) α using Law of Sines (b) a using Law of Cosines
(c) Any angle using Law of Cosines (d) This triangle cannot be solved.
(e) γ using $180^\circ - \alpha - \beta$. (f) c using Law of Sines.

(5)



Using Law of Cosines.

$$a^2 = b^2 + c^2 - 2bc \cos \alpha$$

$$a^2 = 20^2 + 30^2 - 2(20)(30) \cos(60^\circ)$$

$$a^2 = 400 + 900 - 1200 \cdot \frac{1}{2}$$

$$a^2 = 1300 - 600 = 700$$

$$\boxed{a \approx 26}$$

Law of Sines.

$$\frac{\sin 60}{26} = \frac{\sin \beta}{20}$$

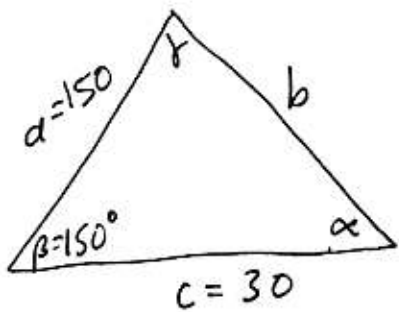
$$0.666 \approx \frac{20 \sin 60}{26} = \sin \beta$$

$$\boxed{42^\circ \approx \beta}$$

$$\text{So } \gamma = 180^\circ - 60^\circ - 42^\circ$$

$$\boxed{\gamma = 78^\circ}$$

⑦ $\beta = 150^\circ$, $a = 150$, $c = 30$



$$b^2 = a^2 + c^2 - 2ac \cos \beta$$

$$b^2 = 150^2 + 30^2 - 2(150)(30) \cos(150^\circ)$$

$$b^2 = 31194.23$$

$$\boxed{b \approx 177}$$

$$\frac{\sin \gamma}{c} = \frac{\sin \beta}{b}$$

$$\frac{\sin \gamma}{30} = \frac{\sin 150}{177}$$

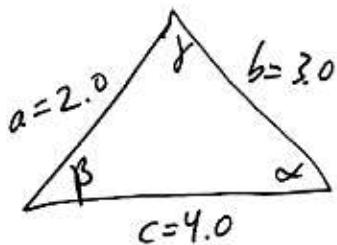
$$\sin \gamma = \frac{30 \sin 150}{177} = 0.085$$

$$\boxed{\gamma \approx 4.875^\circ}$$

$$\alpha = 180^\circ - 150^\circ - 5^\circ$$

$$\alpha = 25^\circ$$

⑪ $a = 2.0$, $b = 3.0$, $c = 4.0$



$$a^2 = b^2 + c^2 - 2bc \cos \alpha$$

$$(2.0)^2 = (3.0)^2 + (4.0)^2 - 2(3.0)(4.0) \cos \alpha$$

$$4 = 9 + 16 - 24 \cos \alpha$$

$$0.875 = \cos \alpha$$

$$\boxed{29^\circ \approx \alpha}$$

$$\frac{\sin \alpha}{a} = \frac{\sin \beta}{b}$$

$$\frac{\sin 29^\circ}{2} = \frac{\sin \beta}{3}$$

$$3 \sin 29^\circ = 2 \sin \beta$$

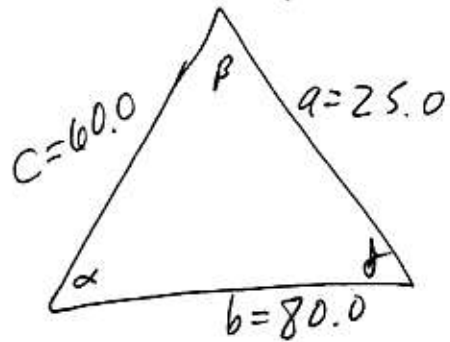
$$0.7272 = \sin \beta$$

$$\boxed{\beta \approx 46.6^\circ}$$

$$\gamma = 180^\circ - 29^\circ - 46.6^\circ$$

$$\boxed{\gamma = 104.4^\circ}$$

$$(13) a = 25.0, b = 80.0, c = 60.0$$



$$\begin{aligned}c^2 &= a^2 + b^2 - 2ab \cos \gamma \\60^2 &= 25^2 + 80^2 - 2(25)(80) \cos \gamma \\-3425 &= -4000 \cos \gamma \\0.85625 &= \cos \gamma \\31.1^\circ &\approx \gamma\end{aligned}$$

$$\begin{aligned}\frac{\sin \beta}{b} &= \frac{\sin \gamma}{c} \\ \frac{\sin \beta}{80} &= \frac{\sin(31.1^\circ)}{60} \\ \sin \beta &= \frac{80 \sin(31.1^\circ)}{60} \\ \sin \beta &= 0.6887 \\ \beta &= 43.5^\circ\end{aligned}$$

$$\begin{aligned}\alpha &= 180^\circ - 31.1^\circ - 43.5^\circ \\ \alpha &= 105.4^\circ\end{aligned}$$