MATH 111–05 (Kunkle), Quiz 8 Name: ____________________

10 pts, 10 minutes April 3, 2018

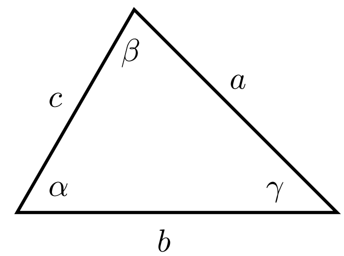
---

1 (10 pts). These 3 problems refer to the figure at the right.

a. Find b if $a = 2$, $\beta = 110°$ and $\gamma = 20°$.

b. Find c if $a = 1$, $b = 2$ and $\gamma = 10°$.

c. Find α if $a = 5$, $b = 6$ and $c = 2$.



Solution:

1a.(Source: 4.12.more.1d) This problem is classified as AAS (given two angles and one side). First find $\alpha = 180° - \beta - \gamma = 50°$. Then, by the Law of Sines,

$$\begin{aligned} \frac{b}{\sin\beta} &= \frac{a}{\sin\alpha} \\ \frac{b}{\sin 110°} &= \frac{2}{\sin 50°} \\ b &= \frac{2\sin 110°}{\sin 50°}. \end{aligned}$$

1b.(Source: 4.12.more.1) This problem is classified as SAS (given two sides and the angle between them). By the Law of Cosines,

$$\begin{aligned} c^2 &= a^2 + b^2 - 2ab\cos\gamma \\ &= 1 + 4 - 4\cos 10° \\ c &= \sqrt{5 - 4\cos 10°} \end{aligned}$$

1c.(Source: 4.13.more.2) This problem is classified as SSS (given three sides). To find α, first find its cosine. By the Law of Cosines,

$$\begin{aligned} a^2 &= b^2 + c^2 - 2bc\cos\alpha \\ 25 &= 36 + 4 - 24\cos\alpha \\ \cos\alpha &= \frac{15}{24} = \frac{5}{8}. \end{aligned}$$

As an angle inside a triangle, α must lie in $[0, \pi]$, which is exactly the range of the inverse cosine. Therefore, $\alpha = \cos^{-1}(\frac{5}{8})$.