

Math 121 – Section 8.3 Solutions

9. Using the Law of Cosines, we have:

$$\begin{aligned}b^2 &= a^2 + c^2 - 2ac \cos B \\b^2 &= 2^2 + 4^2 - 2(2)(4) \cos 45^\circ \\b^2 &= 4 + 16 - 16 \cos 45^\circ \\b &\approx 2.95\end{aligned}$$

Using the Law of Sines, we have:

$$\begin{aligned}\frac{\sin A}{a} &= \frac{\sin B}{b} \\ \frac{\sin A}{2} &= \frac{\sin 45^\circ}{2.95} \\ \sin A &= \frac{2 \sin 45^\circ}{2.95} \\ A &\approx 28.65^\circ\end{aligned}$$

Then $C \approx 106.35^\circ$.

13. Using the Law of Cosines, we have:

$$\begin{aligned}b^2 &= a^2 + c^2 - 2ac \cos B \\ 5^2 &= 6^2 + 8^2 - 2(6)(8) \cos B \\ 25 &= 36 + 64 - 96 \cos B \\ \cos B &= \frac{75}{96} \\ B &\approx 38.62^\circ\end{aligned}$$

Using the Law of Sines, we have:

$$\begin{aligned}\frac{\sin A}{a} &= \frac{\sin B}{b} \\ \frac{\sin A}{6} &= \frac{\sin 38.62^\circ}{5} \\ \sin A &= \frac{6 \sin 38.62^\circ}{5} \\ A &\approx 48.50^\circ\end{aligned}$$

Then $C \approx 92.88^\circ$.

19. Using the Law of Cosines, we have:

$$\begin{aligned}a^2 &= b^2 + c^2 - 2bc \cos A \\ a^2 &= 1^2 + 3^2 - 2(1)(3) \cos 80^\circ \\ a^2 &= 1 + 9 - 6 \cos 80^\circ \\ a &\approx 2.99\end{aligned}$$

Using the Law of Sines, we have:

$$\begin{aligned}\frac{\sin B}{b} &= \frac{\sin A}{a} \\ \frac{\sin B}{1} &= \frac{\sin 80^\circ}{2.99} \\ \sin A &= \frac{\sin 80^\circ}{2.99} \\ A &\approx 19.23^\circ\end{aligned}$$

Then $C \approx 80.77^\circ$.

33. Using the Law of Cosines, we have:

$$\begin{aligned}d^2 &= 150^2 + 35^2 - 2(150)(35) \cos 110^\circ \\ d &\approx 165 \text{ yards}\end{aligned}$$