Give exact answers, not decimal answers.

4(9). \( a = 3, \ b = 1, \ c = 3 \). Find \( \angle B \).

3 side, 1 angle problem with angle \( \angle B \).
Use the cosine law for \( \angle B \).
\[ b^2 = a^2 + c^2 - 2ac \cos B \]
Solve for \( \cos B \).
\[ 2ac \cos B = a^2 + c^2 - b^2 \]
\[ \cos B = \frac{(a^2 + c^2 - b^2)}{2ac} \]
\[ B = \cos^{-1}\left(\frac{(a^2 + c^2 - b^2)}{2ac}\right) \]
\[ = \cos^{-1}\left(\frac{(3^2 + 3^2 - 1^2)}{(2 \cdot 3 \cdot 3)}\right) \]
\[ = \cos^{-1}(17/18) \]

3(9). \( \angle C = 40^\circ, \ b = 3, \ a = 5 \). Find \( c \).

3 side, 1 angle problem with angle \( \angle C \).
Use the cosine law for \( \angle C \).
\[ c^2 = b^2 + a^2 - 2ba \cos C \]
Solve for \( c \).
\[ c = \sqrt{b^2 + a^2 - 2ba \cos C} \]
\[ = \sqrt{3^2 + 5^2 - 2(3)(5) \cos 40^\circ} \]
\[ = \sqrt{34 - 30 \cos 40^\circ} \]

5(6). \( \angle A = 50^\circ, \ a = 4, \ c = 5 \). Find the two values of \( \angle C \).
There are two values since the side opposite is < side adjacent.
2 sides, 2 angle problem.
Use the sine law with sides \( a, c \).
\[ \frac{\sin C}{c} = \frac{\sin A}{a} \]
\[ \sin C = \frac{c \sin A}{a} = \frac{5 \sin 50^\circ}{4} \]
\[ C = \sin^{-1}\left(\frac{5 \sin 50^\circ}{4}\right) \] and
\[ C = 180^\circ - \sin^{-1}\left(\frac{5 \sin 50^\circ}{4}\right) \text{ or} \]
\[ C = \pi - \sin^{-1}\left(\frac{5 \sin 50^\circ}{4}\right) \]

5(10, may omit). A 100 foot tall building is viewed from a point \( S \), the angle of inclination from \( S \) to point \( P \) at the top of the building is 3°. The angle of declination from \( S \) to the point \( Q \) at the bottom of the building is 5°. Find the distance \( d \) between \( S \) and the bottom \( Q \) of the building?
Solve for the one large triangle, not the two smaller right triangles. Include units. This problem is done only if it can be completed before the hour.

\[ \angle PSQ = 8, \ \angle SPQ = 90^\circ - 3^\circ = 87^\circ, \]
\[ \angle SQP = 90^\circ - 5^\circ = 85^\circ \]
\[ \frac{d}{\sin 87^\circ} = \frac{100}{\sin 8^\circ} \]
\[ d = \frac{100 \sin 87^\circ}{\sin 8^\circ} \text{ feet} \]