

MATH 1112 – Quiz 4 (Version 1) Solutions

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Name _____

Instructions. Your work on this quiz will be graded according to two criteria: **mathematical correctness** and **clarity of presentation**. In other words, you must know what you are doing (mathematically) and you must also express yourself clearly. In particular, write answers to questions using correct notation and using **complete sentences** where appropriate. Also, you must supply sufficient detail in your solutions (relevant calculations, written explanations of why you are doing these calculations, etc.). It is not sufficient to just write down an “answer” with no explanation of how you arrived at that answer. As a rule of thumb, the harder that I have to work to interpret what you are trying to say, the less credit you will get.

1. Find the remaining angles and side lengths for the triangle with the information given below. (There may be no solution, one solution or two solutions.)

$$A = 126.5^\circ \quad a = 17.2$$

$$B = \underline{\hspace{2cm}} \quad b = \underline{\hspace{2cm}} \quad .$$

$$C = \underline{\hspace{2cm}} \quad c = 13.5$$

Solution: By the Law of Sines,

$$\frac{\sin(C)}{13.5} = \frac{\sin(126.5^\circ)}{17.2}$$

so

$$\sin(C) = \frac{13.5 \sin(126.5^\circ)}{17.2} \approx 0.6309.$$

Thus

$$C = \sin^{-1}(0.6309) \approx 39.12^\circ$$

or

$$C = 180^\circ - \sin^{-1}(0.6309) \approx 140.88^\circ.$$

The second possibility does not work because $126.5^\circ + 140.88^\circ > 180^\circ$. Thus $C \approx 39.12^\circ$. From this we obtain

$$B = 180^\circ - 39.12^\circ - 126.5^\circ \approx 14.38^\circ.$$

Now we use the Law of Sines to find b :

$$\frac{b}{\sin(14.38^\circ)} = \frac{17.2}{\sin(126.5^\circ)}$$

so

$$b = \frac{17.2 \sin(14.38^\circ)}{\sin(126.5^\circ)} \approx 5.31.$$

There is only one triangle that satisfies the given information and the complete information for it is:

$$A = 126.5^\circ \quad a = 17.2$$

$$B = 14.38^\circ \quad b = 5.31 \quad .$$

$$C = 39.12^\circ \quad c = 13.5$$

2. Find the remaining angles and side lengths for the triangle with the information given below. (There may be no solution, one solution or two solutions.)

$$A = \underline{\hspace{2cm}} \quad a = 1$$

$$B = \underline{\hspace{2cm}} \quad b = 2$$

$$C = \underline{\hspace{2cm}} \quad c = 3.$$

Solution: By the Law of Cosines,

$$\cos(A) = \frac{b^2 + c^2 - a^2}{2bc} = \frac{2^2 + 3^2 - 1^2}{2(2)(3)} = 1.$$

If $\cos(A) = 1$, then $A = 0^\circ$ but there is no triangle that has an angle of 0° so this problem has no solution.