

MAT4010 Pretest Trigonometry

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The goal of this pretest is to make you think about some questions related to “school mathematics from an advanced viewpoint”. You will discuss these questions in breakout rooms at the beginning of class. This will both force you to reflect about your understanding of these topics, and help me gauge your understanding.

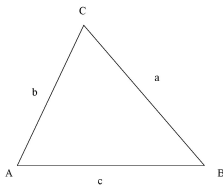
When we finish this part of the course, your homework will be to both write up the answers to the questions, and to answer some questions about the relationship between these questions and school mathematics. All the questions will be discussed in the lectures, but writing up the answers will be a good way for you to review.

You will not be marked on this test, and you can work on it in groups. You can either submit based on the breakout groups or groups of 1–4 people that you form yourself. These pretest-homeworks constitute the “oblig” part of the course, and must be submitted in order to take the exam.

1 Before the Lectures

1.1. When and why do we use radians?

1.2. Given a triangle,



we can sometimes use the law of sines

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C},$$

the law of cosine

$$\begin{aligned}a^2 + b^2 - 2ab \cos C &= c^2, \\a^2 + c^2 - 2ac \cos B &= b^2, \\b^2 + c^2 - 2bc \cos A &= a^2,\end{aligned}$$

and the angle sum theorem

$$A + B + C = 180,$$

to “solve” a triangle, i.e., determine the remaining sides and angles when we are given some of them. Show how you can solve a triangle if you know

SSS All the three sides.

SAS Two sides and the included angle.

SsA Two sides and the angle opposite to the longer side.

ASA or SAA One side and two angles.

- 1.3. Show that if $A = 30$, $b = 4$ and $a = 3$, then you cannot solve the triangle. That is, show that there are two different triangles that satisfy the conditions.
- 1.4. When can the law of sines give you two solutions? How can you make sure that you can use the law of sines safely?
- 1.5. Can the law of cosines ever give you two solutions?

2 Homework after the lectures

- 2.1. Write up answers to the questions above.
- 2.2. Was there anything in this chapter that you had heard about before, but not really understood or not known why it was true?
- 2.3. Was there anything in this chapter that you enjoyed learning about?
- 2.4. Was there anything in this chapter that changed the way you look at this topic?
- 2.5. Was there anything in this chapter that you think you will use in your teaching or that will influence your teaching, either directly or indirectly?

- 2.6. Which of the questions above do you think are likely to come up in your teaching and in which situations? Do you think they will come up often? Do you think they will come from strong students, average students or weak students?
- 2.7. Name three additional situations where the material in this chapter could be useful for your teaching, either directly or indirectly? For instance when planning your teaching, responding to questions, clarifying your own understanding or other situations.
- 2.8. Can you imagine other questions that students might ask? Were there other questions related to these topics that you wondered about when you were in school?