

College of the Redwoods
Mathematics Department

Math 25 — Trigonometry
Exam #5

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Exam Questions

Read Carefully! You have until Monday of next week (4/28/08) to complete the exam. The exam is due, in my hands, at the beginning of class.

This exam is open notes, open book. This includes any supplementary texts or online documents. You must answer all of the exercises on your own. You are not allowed to work in groups or pairs on the exam. You are not allowed to enlist the aid of a tutor or friend to help with the exam. You are not allowed to read the exercises in the exam, then seek help on similar questions. Once you open the exam and read the questions, you may not seek any outside help of any kind.

I am not interested in reading pages and pages of calculations without accompanying narrative. It is essential that you include sound mathematical writing that both explains and justifies your solution or proof. Grammar and punctuation are important, as is the organization of your solution on the written page. Carefully labeled sketches and diagrams are equally important.

When working in the Mathlab or in the study rooms in the Physical Sciences Building (such as rooms PS116 or PS119), please do not work near any other student who is also working on the exam. For the sake of propriety, please separate yourselves when working on the exam in these areas.

Place the solution to each exercise on a separate sheet of paper. On a good sheet of paper, write out (longhand) and sign the following honor pledge.

I promise that all work found herein is my own. I have received no help from tutors, colleagues, or other teachers. I have honored all of the exam constraints listed in the directions.

Arrange your solutions in order, place these exam page(s) on top of your solutions, then place the honor pledge on top of the exam as a cover sheet. Staple. Good luck!

EXERCISE 1. Simplify the following expressions as much as possible. Make sure your final answer is in simple radical form. Please include the carefully labeled sketches with each solution.

(a) $\cos(2 \sin^{-1}(-1/4))$

(b) $\sin(\tan^{-1}(-2) + \tan^{-1}(3))$

EXERCISE 2. Solve each of the following trigonometric equations for x . Your answers must be presented in radians and be restricted to the interval $[0, 2\pi)$.

(a) $2 \cos^2 \frac{x}{2} = 3 \cos x$

(b) $4 + 5 \sin x = 2 \cos^2 x$

EXERCISE 3. An airplane is flies on a bearing of 58° at 400 miles per hour. A wind blowing from west to east at 30 miles per hour blows the plane off course. Find the resulting speed of the plane and its bearing. Please include detailed sketches with your solution. Round your answer to the nearest mile per hour and the nearest tenth of a degree.

EXERCISE 4. Two ropes are attached to hooks in a ceiling beam. The ends of the ropes are attached to a block and the system is allowed to come to rest (equilibrium). The first rope makes an angle of 46° with the horizontal ceiling and has 200 pounds of tension in the rope. The second rope makes an angle of 53° with the ceiling and has 150 pounds of tension in the rope. Find the weight of the block. Please include detailed sketches with your solution.