Math. 302-01
Spring, 2005
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**Second Examination**
*Friday, February 4, 2005*

**Instructions:** This exam should be done on your own paper. Your name should be on each sheet and on the back of the last sheet; the answers should appear written carefully and in order. If in doubt, show intermediate steps: Full credit may not be given, even for correct answers, unless work is arranged clearly and explained. This exam is closed book. You may leave after handing in your exam paper, but be sure to check your answers carefully. You may keep this exam sheet. Each entire problem is worth 30 points, while 10 points are free.

1. Write down an equation for the plane through the points $(-1,-1,-1)$, $(1,-1,-1)$, and $(-1,-1,1)$. Show all of your work.
2. A wind blowing from the north is applying a force of 35 pounds on a bicyclist traveling to the northeast (that is, at an angle of $45°$) at 15 miles per hour. How much work, in foot-pounds, does the cyclist expend to counteract the wind over a period of 3 hours? Draw a diagram, and show all of your work. (*Hint: Be sure to multiply miles by 5280 to get feet.*)
3. An airplane traveling 750 kilometers per hour encounters a wind blowing at 125 kilometers per hour from an angle 10 degrees south of due west. (That is, the wind is blowing from 10 degrees south of west to 10 degrees north of east.)
   (a) In what direction should the plane travel so that its motion with respect to the ground is from due west to due east?
   (b) What is the plane's ground speed when it is traveling in that direction?

   Draw a diagram, and show all of your work. (*Hint: Make sure your calculator is set to degrees, if you are using degrees, and make sure your calculator is set to radians, if you are using radians.*)