Math 126 **Calculus With Analytic Geometry III** **Fall 1995**

QUIZ #2 ANSWERS

10/5/95

Straight lines must be drawn with a ruler; no credit will be given if drawn by hand. Don't worry about algebraically simplifying numbers (i.e. you may leave radicals in the denominator, fractions unreduced, etc.). **Show your work.**

1. The vector $\vec{a}$ has components $(2, -3)$. Find the components of a vector $\vec{b}$ which is parallel to $\vec{a}$ and has length 10.

   ANSWER: The unit vector in the direction of $\vec{a}$ is

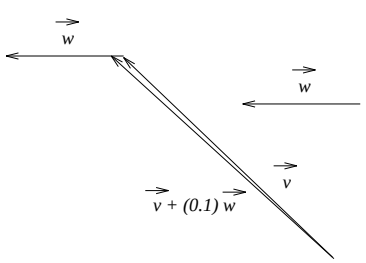
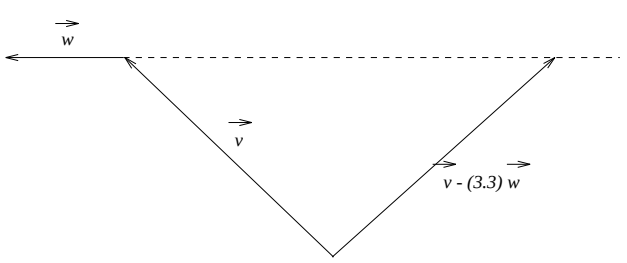
   $$\frac{1}{|\vec{a}|}\vec{a} = \frac{1}{\sqrt{2^2 + (-3)^2}}(2, -3) = \left(\frac{2}{\sqrt{13}}, \frac{-3}{\sqrt{13}}\right).$$

   Therefore, $\vec{b}$ is 10 times this. (Or, alternatively, it could be -10 times it.) Thus

   $$\vec{b} = \boxed{\pm\left(\tfrac{20}{\sqrt{13}}, \tfrac{-30}{\sqrt{13}}\right)}$$

2. The vectors $\vec{v}$ and $\vec{w}$ are shown below. Find a scalar c such that $|\vec{v} + c\vec{w}| = 4$.

   ANSWER: Because of the inaccuracies of printing and photocopying, $\vec{v}$ came out so that its length is very nearly, but not exactly, equal to 4. If it were exactly 4, a perfectly good answer would be $c = 0$. Depending on how accurately you measure $|\vec{v}|$, you might decide that you need to add a small positive multiple of $\vec{w}$ to it to make the length of $\vec{v} + c\vec{w}$ equal to 4. For this problem, any answer between 0 and about 0.2 is acceptable.

   There is also another solution, obtained by adding a large negative multiple of $\vec{w}$ (see below).

   $$c = \boxed{\text{approximately } 0.1, \text{ or } -5.8/1.6 \approx -3.6}$$