HOMEWORK 2
CALCULUS III
DUE 2013-01-22

Show your work!

(1) Recall the problem from class: A camera that weighs 120 lb is supported 4 ft off the ground by a tripod whose feet are equally spaced around a circle of radius 1 ft. We saw that each leg supports a weight of $10\sqrt{17} \approx 41.23$ lb.
   (a) How long are the legs of the tripod?
   (b) If the camera is at $(0, 0, 0)$ and one of the feet of the tripod is at $(0, 1, -4)$, then where are the other two feet of the tripod?
   (c) Suppose that the legs slip (without changing length) so that the feet of the tripod are equally spaced around a circle of radius 2 ft. How high is the camera off the ground?
   (d) In the situation of (c), how much weight does each leg support?

(2) Suppose that the 2-dimensional vector $\vec{u}$ has length ℓ and makes angle α with the positive x-axis, and that the 2-dimensional vector $\vec{v}$ has length m and makes angle β with the positive x-axis.
   (a) In terms of ℓ, m, α, and β, what are the component forms of $\vec{u}$ and $\vec{v}$?
   (b) In terms of α and β, what is the angle θ between $\vec{u}$ and $\vec{v}$?
   (c) By using your answers to (a) and (b), and a trigonometric identity, show that
   $$\vec{u} \cdot \vec{v} = \ell m \cos(\theta).$$
   (**Do not** just cite the identity from class!)

- **10** book problems: #11.2.3, 30, 76, 77, 95; #11.3.7, 9, 18, 27, 36