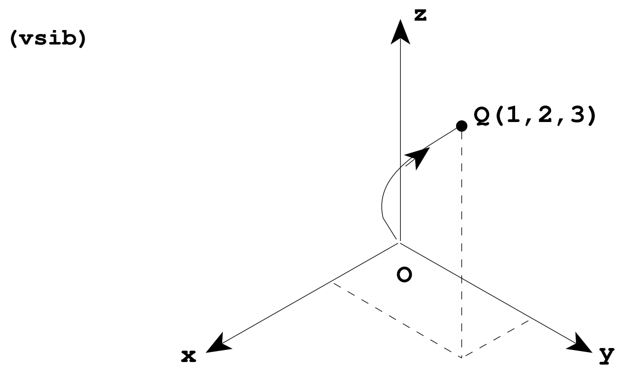
Math 324A & 324B **Advanced Multivariable Calculus I** **Spring 1997**

WORKSHEET #8: 6/3/97

1. C is the curve $(x, y, z) = (t, 2t^3, 3t^2)$, going from the origin to $Q(1, 2, 3)$.



   (a) Compute $\int_C \overrightarrow{F} \cdot d\vec{r}$, where $\overrightarrow{F} = (0, x, 0)$.

   (b) Compute $\int_C (yz + z)dx + xz\, dy + (xy + x)dz$.

2. D is the straight line from the origin to $R(3, 3, 3)$. Compute the tangential component of each of the vector fields below along D, and use it to compute or estimate the line integral over D of each given vector field.

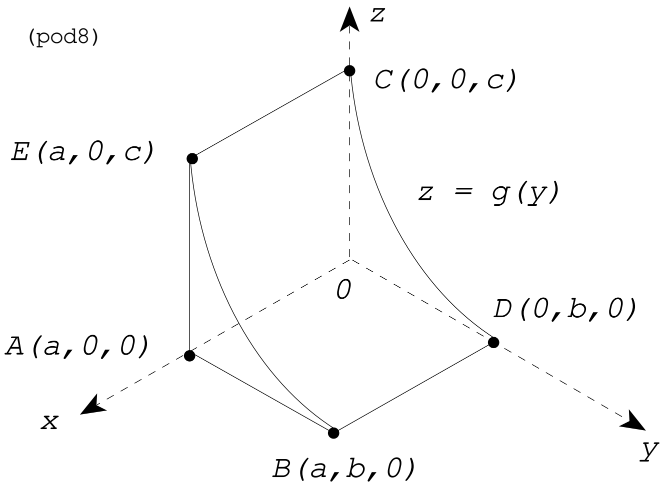
   (a) $\overrightarrow{H} = r^{-1}\vec{r}$, where $\vec{r} = (x, y, z)$ and $r = |\vec{r}|$.

   (b) $\overrightarrow{K} = (y^2, x^2 - y^2, z^2 - x^2)$.

   (c) $\overrightarrow{L} = (-y, x, 0)$.

3. S is the surface shown below (the curved top of the solid); it is the set of points where $z = g(y)$, where

$$g(y) = \frac{c(y-b)^2}{b^2}.$$



(a) Write a parametrization for S.

(b) Set up the surface integral $\int_S \overrightarrow{F} \cdot d\vec{A}$, where $\overrightarrow{F} = (z, 0, y)$.

(c) Evaluate the integral.