# 16.2-3: More Line Integrals

Monday, April 18

## Generic Line Integral

(16.2.15) Find $\int_C z^2\,dx + x^2\,dy + y^2\,dz$ where $C$ is the line segment from $(1, 0, 0)$ to $(4, 1, 2)$.

## Work

An cannonball of mass $m$ is thrown at an angle $\alpha$ and initial velocity $v_0$. Calculate the amount of work gravity does on the cannonball (constant downward force $mg$) from the time it is fired until the time it hits the ground.

(16.2.47)

1. Show that a constant force field does no work on a particle that moves once around the circle $x^2+y^2 = 1$.
2. Is this also true for the force field $\mathbf{F}(x, y) = k\langle x, y\rangle$?
3. How much work will the above fields do if the particle only moves around part of a circle?

## True or False?

1. $\int_{-C} f\, ds = -\int_C f\, ds$
2. If a particle travels in a closed loop then the total work done on the particle over the loop is zero.
3. If we have a region $S$ in (u,v)-space and form a region $R$ by the transformation $x = 2u + v, y = u - 2v$, then the area of $R$ is $1/5$ the area of $S$.
4. If we instead apply the transformation $x = 2u + v, y = 4u + 2v$ then the region of $R$ is zero.
5. If a particle is moving in a constant force field then the work done on the particle is proportional to the distance the object travels.
6. If a particle is moving in a constant force field then the work done on the particle is proportional to the particle's distance from its starting position.