1. Find the path c such that c(0)=(0, -5, 1) and c’(t)=(t, et, t2).
2. Let c(t) be a path, v(t) its velocity, and a(t) the acceleration. Suppose F is a C1 mapping of $R$3 to $R$3, m>0, and F(c(t))=ma(t) (Newton’s second law). Prove that

$$\frac{d}{dt}\left[mc\left(t\right)×v\left(t\right)\right]=c\left(t\right)×F(c\left(t\right))$$

1. Find the arc length of the given curve on the specified interval.

$(sin3t, cos3t, 2t^{3/2}$), for 0$\leq t\leq 1$

1. Let c be the path $c\left(t\right)=(t, t sin t, t\cos(t). )$ Find the arc length of c between the two points (0,0,0) and ($π, 0-π$).
2. Let c: [a,b]$\rightarrow R^{3}$ be an infinitely differentiable path (derivatives of all orders exist). Assume c’(t)$\ne $0 for any t. the vector c’(t)/$∥c^{'}\left(t\right)∥=T(t)$ is tangent to c at c(t), and, because $∥T(t)∥$=1, T is called the unit tangent to c.
3. Show that T’(t)$⋅$T(t)=0.
4. Write down a formula for T’(t) in terms of c.