

Checkpoint: Integrals of space curves

Somehow, you managed to glue a motion tracker to a fly. The motion tracker reports that the velocity of the fly at time t is $\mathbf{v}(t) = \left\langle \frac{t}{1+t^2}, te^{t^2}, \frac{1}{1+t^2} \right\rangle$; for the sake of argument, let's say that the fly started (at time $t = 0$) at the origin $(0, 0, 0)$.

- (a) Find a vector equation for $\mathbf{r}(t)$, the position of the fly at time t .
- (b) How far did the fly travel on the interval $0 \leq t \leq 1$?
(Use Wolfram Alpha or whatever to evaluate a nasty integral if necessary.)