MATH 243: SECTION 13.3 GROUPWORK

(1) Consider the helix given by the vector function

$$\vec{r}(t) = \langle \cos t, \sin t, t/\pi \rangle$$

where $0 \leq t \leq 8\pi$. Calculate the arc length of this helix by setting up and evaluating an appropriate integral.

(2) Set up but do not solve an integral to give the arc length of the curve given by the vector function $\vec{r}(t) = \langle e^t, e^{-t}, t \rangle$ where $-1 \leq t \leq 1$.

(3) Consider the vector function

$$\vec{r}(t) = \langle t^3, t^2, t \rangle.$$

Compute the curvature of the curve given by this vector function at the points $(0, 0, 0)$ and $(1, 1, 1)$. [Hint: $(6t^2 + 2)^2 = 36t^4 + 36t^2 + 4$.]