1. Find the arc length of the curve $C$ described by $x = y^{3/2}$ and with endpoints $(0,0)$ and $(\frac{8}{3\sqrt{3}}, \frac{4}{3})$. (4 points)

$$\text{Arc Length} =$$

2. Let $\mathbf{F}(x,y) = (y^2 \cos x, 2y \sin x + 1)$ and let $C$ be the curve from $(0,0)$ to $(\frac{\pi}{2}, \frac{\pi^3}{8})$ parametrized by $\mathbf{r}(t) = (t, t^3)$. Use the Fundamental Theorem for Line Integrals to compute $\int_C \mathbf{F} \cdot d\mathbf{r}$. (4 points)

$$\int_C \mathbf{F} \cdot d\mathbf{r} =$$

(OVER)
3. You are asked to paint one side of a fence. The fence is not straight; the curve traced out by the base is a quarter circle with radius 2. For convenience, let us imagine this is the quarter circle in the first quadrant (with endpoints (2, 0) and (0, 2)). The height of the fence varies according to the x coordinate by the function $6 - \frac{x}{10}$.

Set up, but do not solve, an integral to measure the area of the fence to be painted. (2 points)