
Physics 342, Homework 4

Remember, x is dummy variable. You may need to write the functions you are minimizing as dependent on z , θ , etc. For example, in problem 2 you are minimizing a $z'(\theta)$. The goal is to solve for z .

1: (medium) - Minimize $\int_{x_1, y_1}^{x_2, y_2} ds$ Where $ds = \sqrt{dx^2 + dy^2}$. This is longer if you fail to notice what $\frac{df}{dx} = 0$ implies. Use equation 6.18 to find the solution. The solution is that $y = Ax + B$. Essentially you are showing that the shortest path between two points in two dimensions is a straight line.

2: (medium) - Minimize the path along the surface of a circular cylinder of radius R . Essentially, minimize $\sqrt{dx^2 + dy^2 + dz^2}$ where R is constant. remember $x = R\cos(\theta)$ and $y = R\sin(\theta)$. Write the function that you are minimizing as $F(z(\theta))$. Show that your answer describes a helix. Use equation 6.18 again.