PHY 337– Problem Set # 1

Read Chapter 6 of Marion.

1. Consider the integral

\[ I \equiv \int_0^1 \sqrt{1 + \left( \frac{dy}{dx} \right)^2} \, dx. \]  \hspace{1cm} (1)

Evaluate \( I \) (using Maple if you prefer) for:

(a) \( y(x) = x \)
(b) \( y(x) = x^2 \)
(c) \( y(x) = x^3 \)

Which function \( y(x) \) yields the smallest value of \( I \) and why?