

# Math Diversion Problem 611

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If there is to be a brave new world, our generation is  
going to have the hardest time living in it.  
— Chancellor Gorkon (Star Trek VI,  
The Undiscovered Country)

The YouTube video is found at:

Source: <https://www.youtube.com/watch?v=Na1yzT97PxQ>  
Title: How to Find the Indefinite Integral  
Presenter: Cole's World of Mathematics

## 1 The Problem

Integrate the following integral:

$$I = \int \frac{(\sqrt{x} - 1)^2}{\sqrt{x}} dx. \quad (1)$$

## 2 The Solution

$$I = \int \frac{(\sqrt{x} - 1)^2}{\sqrt{x}} dx \quad (2a)$$

$$= 2 \int (\sqrt{x} - 1)^2 d(\sqrt{x} - 1) \quad (2b)$$

$$= \frac{2}{3} (\sqrt{x} - 1)^3 + C. \quad (2c)$$