

Find the antiderivative shown below.

$$\int e^{\sqrt{x}} dx$$

- 1) Set $y = \sqrt{x}$ this step is required to transform the integral into a form that works with integration by parts
- $y^2 = x$ square both sides
- $2y dy = dx$ differentiate

- 2) Now go into the integral, and make replacements.

replace \sqrt{x} with y

replace dx with $2y dy$

$$3) \int e^y 2y dy$$

$$\int 2ye^y dy$$

$$2 \int ye^y dy$$

- 4) Now integrate by using integration by parts

$$u = y \quad dv = e^y dy$$

$$du = dy \quad v = e^y$$

$$2 \int ye^y dy = 2 \left(ye^y - \int e^y dy \right) = 2ye^y - 2e^y + C$$

- 5) Replace y with \sqrt{x}

$$\int e^{\sqrt{x}} dx = 2 \cdot \sqrt{x} \cdot e^{\sqrt{x}} - 2e^{\sqrt{x}} + C$$