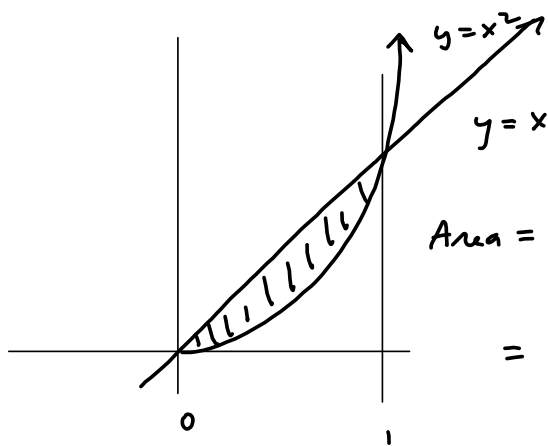


S 4.4 Find the shaded area



$$\text{Area} = \int_0^1 (\text{upper} - \text{lower})$$

$$= \int_0^1 (x - x^2) dx = \left[\frac{x^2}{2} - \frac{1}{3}x^3 \right]_0^1 = \frac{1}{2} - \frac{1}{3} = \boxed{\frac{1}{6}}$$

$$\int_{\sqrt{\frac{\pi}{6}}}^{\sqrt{\frac{\pi}{4}}} x \sin(x^2) dx = \int_{x=\sqrt{\frac{\pi}{6}}}^{x=\sqrt{\frac{\pi}{4}}} x \sin(u) \frac{du}{2x} = \int_{x=\sqrt{\frac{\pi}{6}}}^{x=\sqrt{\frac{\pi}{4}}} \sin(u) \frac{du}{2}$$

Let $u = x^2 \rightarrow$

$du = 2x dx \rightarrow$

$\frac{du}{2x} = dx$

$u = x^2$
 $x = \sqrt{\frac{\pi}{6}} \Rightarrow u = \frac{\pi}{6}$

M1
AVOIDS
THIS

M2

$$= \frac{1}{2} \int_{\frac{\pi}{6}}^{\frac{\pi}{4}} \sin(u) du = \frac{1}{2} [-\cos(u)]_{\frac{\pi}{6}}^{\frac{\pi}{4}}$$

$$= -\frac{1}{2} \left[\cos\left(\frac{\pi}{4}\right) - \cos\left(\frac{\pi}{6}\right) \right] = -\frac{1}{2} \left[\frac{\sqrt{2}}{2} - \frac{\sqrt{3}}{2} \right] = \frac{\sqrt{2} - \sqrt{3}}{4}$$

M1

$$= \frac{1}{2} \int_{x=\sqrt{\frac{\pi}{6}}}^{x=\sqrt{\frac{\pi}{4}}} \sin(u) du = \frac{1}{2} [-\cos(u)]_{x=\sqrt{\frac{\pi}{6}}}^{x=\sqrt{\frac{\pi}{4}}}$$

$$= \frac{1}{2} [-\cos(x^2)]_{\sqrt{\frac{\pi}{6}}}^{\sqrt{\frac{\pi}{4}}} = -\frac{1}{2} \left[\cos\left(\frac{\pi}{4}\right) - \cos\left(\frac{\pi}{6}\right) \right]$$

$$= \dots = \frac{\sqrt{2} - \sqrt{3}}{4}$$

$$\int_0^1 (x + x^2) dx = \left[\frac{x^2}{2} + \frac{x^3}{3} \right]_0^1$$

more than 1 term?
use 2 brackets

$$48. \int_0^4 \frac{x}{\sqrt{1+2x}} dx$$

$$\begin{aligned} u &= 2x+1 \rightarrow \\ du &= 2dx \quad \& \quad u-1 = 2x \rightarrow \\ \frac{du}{2} &= dx \quad \quad \frac{u-1}{2} = x \rightarrow \end{aligned}$$

$$\left. \begin{aligned} x=0 &\rightarrow u=2(0)+1=1 \\ x=4 &\rightarrow u=2(4)+1=9 \end{aligned} \right\}$$

$$\int_1^9 \frac{\frac{u-1}{2}}{\sqrt{u}} \cdot \frac{du}{2} = \frac{1}{4} \int_1^9 (u-1)u^{-\frac{1}{2}} du \stackrel{\text{Jesse}}{=} \frac{1}{4} \int_1^9 [u^{\frac{1}{2}} - u^{-\frac{1}{2}}] du$$

$$= \frac{1}{4} \left[\frac{2}{3} u^{\frac{3}{2}} - 2u^{\frac{1}{2}} \right]_1^9 = \frac{1}{4} \left[\frac{2}{3}(27) - 2(3) - \left(\frac{2}{3} - 2 \right) \right]$$

$$= \frac{1}{4} \left[18 - 6 - \left(-\frac{4}{3} \right) \right] = \frac{1}{4} \left[12 + \frac{4}{3} \right] = \frac{1}{4} \left[\frac{36+4}{3} \right] = \frac{1}{4} \left[\frac{40}{3} \right] = \frac{10}{3}$$

$$\int_0^4 \frac{x}{\text{sqrt}(2 \cdot x + 1)} dx = \frac{10}{3} \checkmark$$

Wolfram Alpha can clobber any of these!

<https://www.wolframalpha.com/input?i=integrate+x%2Fsqrt%282x%2B1%29+from+x+%3D+0+to+x+%3D+4>



integrate x/sqrt(2x+1) from x = 0 to x = 4



NATURAL LANGUAGE

MATH INPUT

EXTENDED KEYBOARD

EXAMPLES

UPLOAD

RANDOM

Definite integral

More digits

Step-by-step solution

$$\int_0^4 \frac{x}{\sqrt{2x+1}} dx = \frac{10}{3} \approx 3.3333$$