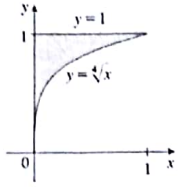
1. **(1 point)** Library/UCSB/Stewart5_5_4/Stewart5_5_4_44/Stewart5_5_4_44.pg

The boundaries of the shaded region are the y-axis, the line $y = 1$, and the curve $y = \sqrt[4]{x}$. Find the area of this region by writing x as a function of y and integrating with respect to y.



Area = _____

Correct Answers:

- 1/5

2. **(1 point)** Library/Utah/AP_Calculus_I/set6_The_Integral/1220s1p22.pg

More on Areas. Farmer Jones, and his wife, Dr. Jones, both mathematicians, decide to build a fence in their field to keep the sheep safe. Being mathematicians, they decide that the fences are to be in the shape of the parabolas $y = 10x^2$ and $y = x^2 + 7$. What is the area of the enclosed region?

_____

Correct Answers:

- 8.23122630108984

3. **(1 point)** Library/Rochester/setIntegrals19Area/ns6_1_99.pg

Find the area between the curves:
$y = x^3 - 9x^2 + 18x$
and $y = -x^3 + 9x^2 - 18x$

_____

Correct Answers:

- 81

4. **(1 point)** Library/AlfredUniv/anton8e/chapter6/6.5/mummert2.pg

Sketch the region between $y = x^2 + x - 2$ and the x-axis over the interval $[-5, 6]$.

Find the area of the region.

The area is _____.

Correct Answers:

- 106.166666666667

Solns to sample Qs.

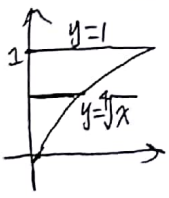
#1. Way1 (Let's do dx)

$$\int_0^1 1 - x^{\frac{1}{4}}\,dx$$

$$= x - \frac{x^{\frac{5}{4}}}{\frac{5}{4}}\Big|_{x=0}^{x=1}$$

$$= 1 - \frac{4}{5} = \frac{1}{5}$$

Way2 (Let's do dy as required!)



$y = \sqrt[4]{x} \Leftrightarrow y^4 = x$

$$\int_0^1 y^4\,dy$$

$$= \frac{y^5}{5}\Big|_{y=0}^{y=1}$$

$$= \frac{1}{5}.$$

#2. Find intersections:

$10x^2 = x^2 + 7$

$x^2 = \frac{7}{9}$

$x = \pm\sqrt{\frac{7}{9}}$ ← 2 intersections

$$\Rightarrow \text{Area} = \int_{-\sqrt{\frac{7}{9}}}^{\sqrt{\frac{7}{9}}} \left|10x^2 - (x^2+7)\right| dx$$

$$= \int_{-\sqrt{\frac{7}{9}}}^{\sqrt{\frac{7}{9}}} x^2 + 7 - 10x^2\,dx$$

$$= \int_{-\sqrt{\frac{7}{9}}}^{\sqrt{\frac{7}{9}}} 7 - 9x^2\,dx$$

$$= 7x - 3x^3\Big|_{x=-\sqrt{\frac{7}{9}}}^{x=\sqrt{\frac{7}{9}}}$$

$$= 7\sqrt{\frac{7}{9}} - 3\left(\sqrt{\frac{7}{9}}\right)^3 - \left[-7\sqrt{\frac{7}{9}} - 3\left(-\sqrt{\frac{7}{9}}\right)^3\right]$$

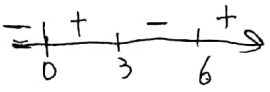
#3. Find intersections.

$x^3 - 9x^2 + 18x = -x^3 + 9x^2 - 18x$

$x(x-3)(x-6) = 0$

$x = 0, 3, 6$ → 3 intersections

$$\text{Area} = \int_0^6 \left|2x^3 - 18x^2 + 36x\right| dx$$



$$\Rightarrow \text{Area} = \int_0^3 2x^3 - 18x^2 + 36x\,dx - \int_3^6 2x^3 - 18x^2 + 36x\,dx$$

$$= \left(2\frac{x^4}{4} - 18\frac{x^3}{3} + 36\frac{x^2}{2}\right)\Big|_{x=0}^{x=3} - \left(2\frac{x^4}{4} - 18\frac{x^3}{3} + 36\frac{x^2}{2}\right)\Big|_{x=3}^{x=6}$$

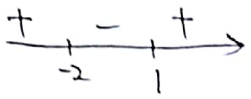
$$= \left(\frac{81}{2} - 6\times 27 + 18\times 9\right) - \left(\frac{6^4}{2} - 6\times 6^3 + 18\times 6^2\right) + \left(\frac{81}{2} - 6\times 27 + 18\times 9\right)$$

$$= 81.$$

#4

$$\text{Area} = \int_{-5}^{6} |x^2+x-2|\,dx$$

$(x+2)(x-1)=0 \Rightarrow x=-2, 1$



$$\text{Area} = \int_{-5}^{-2} x^2+x-2\,dx - \int_{-5}^{1} x^2+x-2\,dx + \int_{1}^{6} x^2+x-2\,dx$$

$$= \left(\frac{x^3}{3}+\frac{x^2}{2}-2x\right)\Big|_{x=-5}^{x=-2} - \left(\frac{x^3}{3}+\frac{x^2}{2}-2x\right)\Big|_{x=-5}^{x=1} + \left(\frac{x^3}{3}+\frac{x^2}{2}-2x\right)\Big|_{x=1}^{x=6}$$

$$= 2\times\left[\frac{(-5)^3}{3}+\frac{25}{2}+10\right] - \left(\frac{-8}{3}+2+4\right) - 2\left(\frac{1}{3}+\frac{1}{2}-2\right) + \left(\frac{6^3}{3}+\frac{36}{2}-12\right)$$

= ... long calculation (omitted here ...)