

Math / Find the area bounded by the curve $y = 1/\sqrt{x(2-x)}$

Question Answered step-by-step

pleaseeee help me this..thankyou. calculus subject

21. Find the area bounded by the curve $y = 1/\sqrt{x(2-x)}$, its asymptotes and the x axis.

22. Find the area between the curve $y = 1/(e^x + e^{-x})$ and the x axis.

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21. Find the area bounded by the curve $y = 1/\sqrt{x(2-x)}$, its asymptotes, and the x axis. 22. Find t... Show more

Math



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Answers are

21. π square units

22. $\pi/2$ square units

Step-by-step explanation

We know that the area between the curve $y = f(x)$ and x-axis from $x = a$ to $x = b$ is given by

$$\int_a^b f(x) dx$$

A) Here $y = f(x) = \frac{1}{\sqrt{x(2-x)}}$

Vertical asymptotes of $f(x)$ are given by $x(2-x) = 0 \Rightarrow x = 0$ and $x = 2$.

Image transcription text

We know that the area between the curve $y = f(x)$ and x-axis from $x = a$ to $x = b$ is given by $\int_a^b f(x) dx$. Here $y = f(x) = 1/\sqrt{x(2-x)}$. Vertical asymptotes of $f(x)$ are given by $x(2-x) = 0 \Rightarrow x = 0$ and $x = 2$. Show less

\therefore here $f(x) = \frac{1}{\sqrt{x(2-x)}}$

$a = 0, b = 2$

\therefore Required area

$$= \int_0^2 f(x) dx$$

$$= \int_0^2 \frac{1}{\sqrt{x(2-x)}} dx$$

$$= \int_0^2 \frac{1}{\sqrt{2x-x^2}} dx$$

(adding and subtracting 1 in the denominator)

Image transcription text

Here $f(x) = 1/\sqrt{x(2-x)}$. $a = 0, b = 2$. Required area $= \int_0^2 f(x) dx = \int_0^2 \frac{1}{\sqrt{x(2-x)}} dx$. Show less

$$= \int_0^2 \frac{1}{\sqrt{4-(4-2x+x^2)}} dx$$

$$= \int_0^2 \frac{1}{\sqrt{4-(1-x)^2}} dx$$

$A = \int_0^2 \frac{1}{\sqrt{4-(1-x)^2}} dx$ $\{ \because a^2 - 2ab + b^2 = (a-b)^2 \}$

Let $u = 1-x$

then $\frac{du}{dx} = \frac{d}{dx}(1-x)$

$$= \frac{du}{dx}(1) - \frac{du}{dx}(x)$$


$$= 0 - 1 = -1$$

$du = -dx$

Image transcription text


$2 \cdot 4 - (4 - 2x + x^2) \cdot du = 2 du - (12 - 2x + 2x^2) \cdot A = 2 \cdot 0 - (1 - 2) \cdot 1 = a^2 - 2ab + b^2 = (a-b)^2$. Let $u = 1 - x$ then $du = d(1-x) = -dx$. $\therefore a^2 - 2ab + b^2 = (a-b)^2$. Show less


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Student review  100% (1 rating)


Thorough explanation Easy to follow

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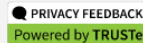
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