$$y'|x|\sqrt{x^2-1} = y \qquad y(1) = 3$$

$$\int \frac{dy}{y} = \int \frac{dx}{|x|\sqrt{x^2-1}}$$

$$\ln|y| = \sec^{-1}x + C$$

$$y = e^{\sec^{-1}x + c} = ce^{\sec^{-1}x}$$

$$3 = ce^{\sec^{-1}1} \qquad 3 = c \cdot 1 \qquad c = 3$$

$$y = 3e^{\sec^{-1}x}$$

Find $y(0.2)$ using Euler's method

if $\frac{dy}{dx} = y^2$ and $y(0) = 1$.

Use $\Delta x = 0.1$

$$y_{next} = y_{current} + \Delta x \cdot \text{slope}$$

$$y(0.1) = 1 + 0.1(1)^2 = 1.1$$

slope at $(0.1, 1.1) = 1.21$

$$y(0.2) = 1.1 + 0.1(1.21) = 1.1 + 0.121$$

$$= 1.221$$

Converge or diverge?

$$\int_0^4 \frac{dx}{\sqrt{4-x}} \qquad u = 4-x \qquad du = -1\,dx$$

$$-\int_4^0 \frac{du}{u^{1/2}} = \int_0^4 \frac{du}{u^{1/2}} \quad \text{converge}$$

$$\int_\pi^\infty \frac{dx}{x^3} \quad \text{converge}$$

$$\int_0^1 \frac{dx}{\sqrt{x+1}} < \int_0^1 \frac{dx}{\sqrt{x}}$$

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$$\int_2^\infty \frac{dx}{x^3} \qquad \int_2^\infty \frac{dx}{(x-1)^2} > \int_2^\infty \frac{dx}{x^2}$$

? C

2

?

C.

x	$\frac{1}{x^3}$	$\frac{1}{(x-1)^2}$
2	$\frac{1}{8}$	1
5	$\frac{1}{125}$	$\frac{1}{16}$

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$$\text{average value} = \frac{1}{b-a} \int_a^b f(x)\, dx$$