Classification of $\int_{1}^{\infty} \frac{1}{x^p} dx$.

Write " $< \infty$ " or " $= \infty$ " after each improper integral. Plot the values of p on the number line for which $\int_{1}^{\infty} \frac{1}{x^p} dx < \infty$

p — number line with points at **-1**, **0**, **1**

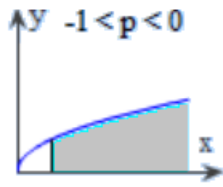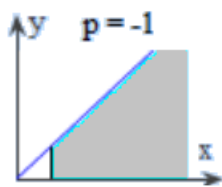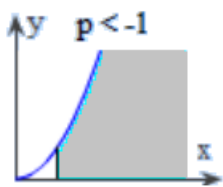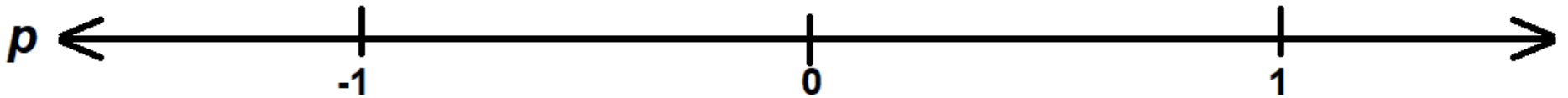| y $p<-1$ | y $p=-1$ | y $-1<p<0$ | y $p=0$ | y $0<p<1$ | y $p=1$ | y $p>1$ |
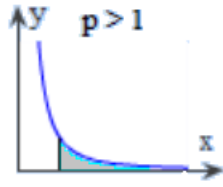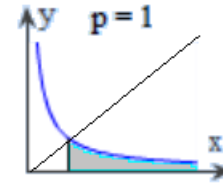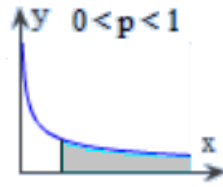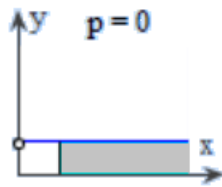
Example:

$p = -2$

$$\int_{1}^{\infty} \frac{1}{x^{-2}} dx$$

$p = -1$

$$\int_{1}^{\infty} \frac{1}{x^{-1}} dx$$

$p = -0.5$

$$\int_{1}^{\infty} \frac{1}{x^{-0.5}} dx$$

$p = 0$

$$\int_{1}^{\infty} \frac{1}{x^{0}} dx$$

$p = 0.5$

$$\int_{1}^{\infty} \frac{1}{x^{0.5}} dx$$

$y = \frac{1}{x^{0.5}}$ 'hugs' its

_____
asymptote

$p = 1$

$$\int_{1}^{\infty} \frac{1}{x^{1}} dx$$

$y = \frac{1}{x}$ 'hugs'

neither of its
asymptotes.
It is symmetric
about the line

_____.

$p = 2$

$$\int_{1}^{\infty} \frac{1}{x^{2}} dx$$

$y = \frac{1}{x^{2}}$ 'hugs' its

_____
asymptote

Classification of $\int_0^1 \dfrac{1}{x^p}\,dx$.

Write " $< \infty$ " or " $= \infty$ " after each improper integral. Plot the values of p on the number line for which $\int_0^1 \dfrac{1}{x^p}\,dx < \infty$

p

-1   0   1

| y $p<-1$ | y $p=-1$ | y $-1<p<0$ | y $p=0$ | y $0<p<1$ | y $p=1$ | y $p>1$ |
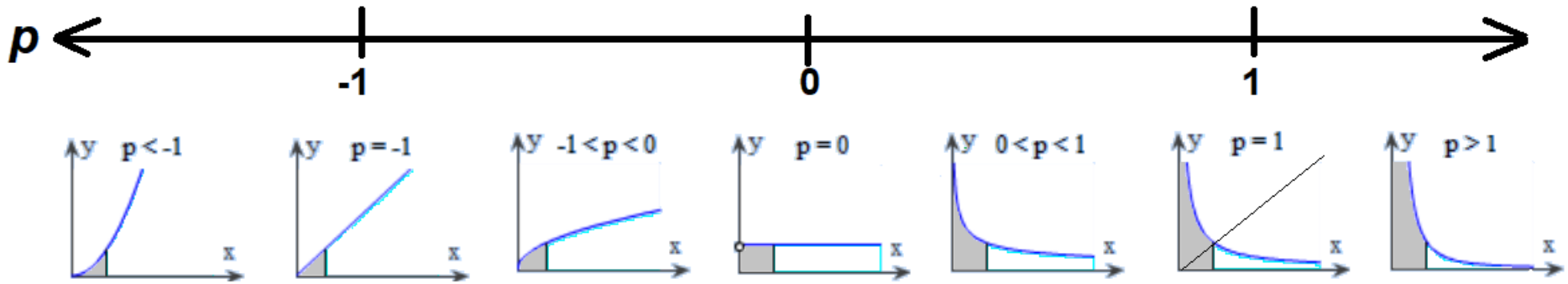
Example:

$p = -2$

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

$p = -1$

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

$p = -0.5$

$$\int_0^1 \frac{1}{x^{-0.5}}\,dx$$

$p = 0$

$$\int_0^1 \frac{1}{x^0}\,dx$$

$p = 0.5$

$$\int_0^1 \frac{1}{x^{0.5}}\,dx$$

$y = \dfrac{1}{x^{0.5}}$ 'hugs" its

_____

asymptote

$p = 1$

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

$y = \dfrac{1}{x}$ 'hugs"

neither of its

asymptotes.

It is symmetric

about the line

_____ .

$p = 2$

$$\int_0^1 \frac{1}{x^2}\,dx$$

$y = \dfrac{1}{x^2}$ 'hugs" its

_____

asymptote