16. $y = x \ln(x^2)$

DOMAIN

$x^2 \neq 0$

$x \neq 0$

$x \neq 0$

X-INT

$0 = x \ln(x^2)$

$x = 0$

$\ln x^2 = 0$

$e^0 = x^2$

$1 = x^2$

$\pm\sqrt{1} = x$

$x = \pm 1$

Y-INT

$y = 0 \ln 0^2$

NONE

ASYMPTOTES

$x^2 = 0$

$x = 0$

$y = \underset{P}{x} \underset{Q}{\ln(x^2)}$

$P' = 1 \quad Q' = \frac{1}{x^2} \cdot \frac{d}{dx}(x^2)$

$Q' = \frac{2x}{x^2}$

$Q' = \frac{2}{x}$

$P'Q + PQ'$

$y' = 1 \cdot \ln(x^2) + x \cdot \frac{2}{x}$

$= \ln(x^2) + 2$

$\ln(x^2) + 2 = 0$

$\ln(x^2) = -2$

$e^{-2} = x^2$

$\frac{1}{e^2} = x^2$

$\pm\sqrt{\frac{1}{e^2}} = x$

$\pm\frac{1}{e} = x$

$x = -\frac{1}{e}$ (-.4) $\qquad x = \frac{1}{e}$ (.4)

$-\infty$	$x = -2$	$x = .1$	$x = 2$	∞
	$\ln(-2)^2 + 2$	$\ln(.1)^2 + 2$	$\ln 2^2 + 2$	
	$\ln 4 + 2$			
		REL MAX	REL MIN	

REL MAX $\left(-\frac{1}{e}, \frac{2}{e}\right) = (-.4, .7)$

REL MIN $\left(\frac{1}{e}, -\frac{2}{e}\right) = (0.4, .7)$

$x = -\frac{1}{e}$

$y = -\frac{1}{e}\ln\left(-\frac{1}{e}\right)^2$

$= -\frac{1}{e}\ln\frac{1}{e^2}$

$= \frac{2}{e}$

$x = \frac{1}{e}$

$y = \frac{1}{e}\ln\left(\frac{1}{e}\right)^2$

$= -\frac{2}{e}$

INC $(-\infty, -\frac{1}{e})$ or $(-\infty, -.4)$

DEC $(-\frac{1}{e}, 0), (0, \frac{1}{e})$

$(-.4, 0), (0, .4)$

INC $(\frac{1}{e}, \infty)$ or $(.4, \infty)$