The Derivative of a Power Function

Examine the following pattern. Then complete the boxes.

y	y'
$y = x$	$y' = \frac{d}{dx}(x) = \square$
$y = x^2$	$y' = \frac{d}{dx}(x^2) = 2x$
$y = x^3$	$y' = \frac{d}{dx}(x^3) = 3x^2$
$y = x^4$	$y' = \frac{d}{dx}(x^4) = 4x^3$
$y = x^5$	$y' = \frac{d}{dx}(x^5) = 5x^4$
$y = x^6$	$y' = \frac{d}{dx}(x^6) = \square x^{\square}$
$y = x^7$	$y' = \frac{d}{dx}(x^7) = \square x^{\square}$
$y = x^{100}$	$y' = \frac{d}{dx}(x^{100}) = \square x^{\square}$
$y = x^n$	$y' = \frac{d}{dx}(x^n) = \square$

Examine the following pattern. Then complete the boxes.

$$\frac{1}{x} = x^{-1} \qquad y' = \frac{d}{dx}\left(x^{-1}\right) = -x^{-2} = -\frac{1}{x^2}$$

$$\frac{1}{x^2} = x^{-2} \qquad y' = \frac{d}{dx}\left(x^{-2}\right) = -2x^{-3} = -\frac{2}{x^3}$$

$$\frac{1}{x^3} = x^{-3} \qquad y' = \frac{d}{dx}\left(x^{-3}\right) = -3x^{-4} = -\frac{3}{x^4}$$

$$\frac{1}{x^4} = x^{-4} \qquad y' = \frac{d}{dx}\left(x^{-4}\right) = -4x^{-5} = -\frac{4}{x^5}$$

$$\frac{1}{x^5} = x^{-5} \qquad y' = \frac{d}{dx}\left(x^{-5}\right) = \square\, x^{\square} = -\frac{\square}{x^{\square}}$$

$$\frac{1}{x^6} = x^{-6} \qquad y' = \frac{d}{dx}\left(x^{-6}\right) = \square\, x^{\square} = -\frac{\square}{x^{\square}}$$

$$\frac{1}{x^{100}} = x^{-100} \qquad y' = \frac{d}{dx}\left(x^{-100}\right) = \square\, x^{\square} = -\frac{\square}{x^{\square}}$$

$$\frac{1}{x^{500}} = x^{-500} \qquad y' = \frac{d}{dx}\left(x^{-500}\right) = \square$$