Soln POW 9/19/16

$$\omega = \frac{\left(x+\frac{1}{x}\right)^6 - \left(x^6+\frac{1}{x^6}\right) - 2}{\left(x+\frac{1}{x}\right)^3 + \left(x^3+\frac{1}{x^3}\right)}$$

$$= \frac{\left[\left(x+\frac{1}{x}\right)^3 + \left(x^3+\frac{1}{x^3}\right)\right]\cdot\left[\left(x+\frac{1}{x}\right)^3 - \left(x^3+\frac{1}{x^3}\right)\right]}{\left[\left(x+\frac{1}{x}\right)^3 + \left(x^3+\frac{1}{x^3}\right)\right]}$$

$$= \left(x+\frac{1}{x}\right)^3 - \left(x^3+\frac{1}{x^3}\right)$$

$$= x^3 + 2x + \frac{1}{x} + x + \frac{2}{x} + \frac{1}{x^3} - x^3 - \frac{1}{x^3}$$

$$= 3x + \frac{3}{x}$$

$$= 3\left(x+\frac{1}{x}\right)$$

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

$$0 = 3\left(1-\frac{1}{x^2}\right)$$

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

$$x^2 = 1$$

$x = \pm 1$ Condition states $x > 0$, so $x = 1$

at $x = 1$

$f(1) = \boxed{6}$