$a_n = \dfrac{x^n}{6^n n^4}$, so $\lim\limits_{n\to\infty} \left|\dfrac{a_{n+1}}{a_n}\right| = \lim\limits_{n\to\infty} \left|\dfrac{x^{n+1}}{6^{n+1}(n+1)^4} \cdot \dfrac{6^n n^4}{x^n}\right| = \lim\limits_{n\to\infty} \dfrac{|x|}{6}\left(\dfrac{n}{n+1}\right)^4 = \dfrac{|x|}{6}$. By the Ratio Test, the series $\sum\limits_{n=1}^{\infty} \dfrac{x^n}{6^n n^4}$ converges when $\dfrac{|x|}{6} < 1 \quad\Leftrightarrow\quad |x| < 6$, so $R = 6$. When $x = -6$, we get the series $\sum\limits_{n=1}^{\infty} \dfrac{(-1)^n}{n^4}$, which converges by the Alternating Series Test. When $x = 6$, we get the convergent p-series $\sum\limits_{n=1}^{\infty} \dfrac{1}{n^4} \quad [\,p = 4 > 1]$. Thus, $I = [-6, 6]$.