4. Here is a power series in expanded form. Find the radius of convergence and the interval of convergence.

$1 + 5x + x^2 + 5x^3 + x^4 + 5x^5 + \ldots.$

Consider the series with this grouping.

$(1+5x) + (1+5x)x^2 + (1+5x)\cdot x^4 + \cdots$

now the series looks geometric.

$a = 1+5x \qquad r = x^2 \qquad Sum = \frac{a}{1-r} = \frac{1+5x}{1-x^2}$

for convergence we need: $|r|<1$

$|x^2| < 1$

$|x| < \sqrt{1} = 1$

$\ell = 1 \qquad I = (-1, 1)$