Find the radius of convergence and interval of convergence of the series.

1) $\sum_{n=1}^{\infty} \frac{x^n}{\sqrt{n}}$ $\boxed{R=1 \quad I=[-1, 1)}$

2) $\sum_{n=0}^{\infty} \frac{(-1)^n x^n}{n+1}$ $\boxed{R=1 \quad I=(-1, 1]}$

3) $\sum_{n=1}^{\infty} \frac{(-1)^{n-1} x^n}{n^3}$ $\boxed{R=1 \quad I=[-1, 1]}$

4) $\sum_{n=1}^{\infty} \sqrt{n} x^n$ $\boxed{R=1 \quad I=(-1, 1)}$

5) $\sum_{n=0}^{\infty} \frac{x^n}{n!}$ $\boxed{R = \infty \quad I = (-\infty,\ \infty)}$

6) $\sum_{n=1}^{\infty} n^n x^n$ $\boxed{R = 0 \quad I = \{0\}}$

7) $\sum_{n=1}^{\infty} (-1)^n 4^n n x^n$ $\boxed{R = \frac{1}{4} \quad I = \left(-\frac{1}{4}, \frac{1}{4}\right)}$

8) $\sum_{n=1}^{\infty} \frac{x^n}{3^n n}$ $\boxed{R = 3 \quad I = [-3,\ 3)}$

9) $\sum_{n=1}^{\infty} \frac{(-2)^n x^n}{\sqrt[4]{n}}$ $\boxed{R = \frac{1}{2} \quad I = \left(-\frac{1}{2}, \frac{1}{2}\right]}$

10) $\sum_{n=2}^{\infty} (-1)^n \frac{x^n}{4^n \ln n}$ $\boxed{R = 4 \quad I = (-4, 4]}$

11) $\sum_{n=0}^{\infty} (-1)^n \frac{x^{2n}}{(2n)!}$ $\boxed{R = \infty \quad I = (-\infty, \infty)}$

12) $\sum_{n=0}^{\infty} \sqrt{n}\,(x-1)^n$ $\boxed{R = 1 \quad I = (0, 2)}$

13) $\sum_{n=1}^{\infty}(-1)^n\frac{(x+2)^n}{2^n n}$ $\boxed{R=2 \quad I=(-4,\,0]}$

14) $\sum_{n=1}^{\infty}\frac{(3x-2)^n}{3^n n}$ $\boxed{R=1 \quad I=\left[-\frac{1}{3},\,\frac{5}{3}\right)}$

15) $\sum_{n=1}^{\infty}n!(2x-1)^n$ $\boxed{R=0 \quad I=\left\{\frac{1}{2}\right\}}$

16) $\sum_{n=2}^{\infty}(-1)^n\frac{(2x+3)^n}{n\ln n}$ $\boxed{R=\frac{1}{2} \quad I=(-2,\,-1]}$

17) Suppose that $\sum_{n=0}^{\infty} c_n x^n$ converges when $x=-4$ and diverges when $x=6$. What can be said about the convergence or divergence of the following series?

a) $\sum_{n=0}^{\infty} c_n$ $\boxed{\text{Convergent}}$

b) $\sum_{n=0}^{\infty} c_n 8^n$ $\boxed{\text{Divergent}}$

c) $\sum_{n=0}^{\infty} c_n (-3)^n$ $\boxed{\text{Convergent}}$

d) $\sum_{n=0}^{\infty} (-1)^n c_n 9^n$ $\boxed{\text{Divergent}}$

18) If k is a positive integer, find the radius of convergence of the series: $\sum_{n=0}^{\infty} \frac{(n!)^k}{(kn)!} x^n$

$$\boxed{R = k^k}$$