Directions: For the given power series, determine the values of x for which the series is absolutely convergent, conditionally convergent, and divergent. State the interval of convergence, and the radius of convergence. Show all work.

1. $$\sum_{n=1}^{\infty} \frac{3^n x^n}{n^2}$$

2. $$\sum_{n=1}^{\infty} \frac{3^n x^n}{n!}$$

3. $$\sum_{n=1}^{\infty} \frac{n!}{(1000x)^n}$$

4.

$$\sum_{n=1}^{\infty} \frac{(x+1)^n}{5^n\sqrt{n}}$$

5.

$$\sum_{n=1}^{\infty} \frac{(x-1)^n}{7^n n}$$