Power series

7.1 Find the radius of convergency and interval of convergency (if possible)

a) $\sum_{n=1}^{\infty} \frac{n(x-1)^n}{9^n(n^2+3)}$ **b)** $\sum_{n=1}^{\infty} \frac{5^n-(-3)^n}{n^2} x^n$ **c)** $\sum_{n=1}^{\infty} \frac{4+(-1)^n}{n} x^n$ **d)** $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}(x+5)^n}{n3^n}$

e) $\sum_{n=1}^{\infty} \frac{(x-2)^n}{2^{n-1}(n+3)}$ **f)** $\sum_{n=1}^{\infty} (-1)^n \frac{x^n}{\sqrt{n^2+n}}$ **g)** $\sum_{n=1}^{\infty} (2n+1)(x+3)^n$ **h)** $\sum_{n=1}^{\infty} \frac{n(3n+2)}{3^n} x^{2n}$

i) $\sum_{n=1}^{\infty} \frac{(3n)!}{(n!)^3} x^n$ **j)** $\sum_{n=1}^{\infty} \frac{(n^2+5n)3^{2n}}{2^{3n}} x^n$ **k)** $\sum_{n=1}^{\infty} \frac{2^n+n^2}{5^n+n^5} x^n$ **l)** $\sum_{n=2}^{\infty} \frac{(x+3)^n}{\sqrt{2^n+3^n}}$

7.2 Write the expansionf of function $f(x)$ as a power series at x_0

a) $f(x) = \frac{1}{1+x^3}, \quad x_0 = 0$ **b)** $f(x) = \frac{1}{1+x}, \quad x_0 = 2$ **c)** $f(x) = \frac{x}{x^2-5x+6}, \quad x_0 = 1$

d) $f(x) = \frac{1}{(1-x)^3}, \quad x_0 = 0$ **e)** $f(x) = x^2 e^{2x}, \quad x_0 = 0$ **f)** $f(x) = \operatorname{arc\,tg} x, \quad x_0 = 0$

g) $f(x) = \ln x, \quad x_0 = 3$ **h)** $f(x) = \ln(4-x^2), \quad x_0 = 0$ **i)** $f(x) = \frac{x}{(1-x)(1-x^2)}, \ x_0 = 0$