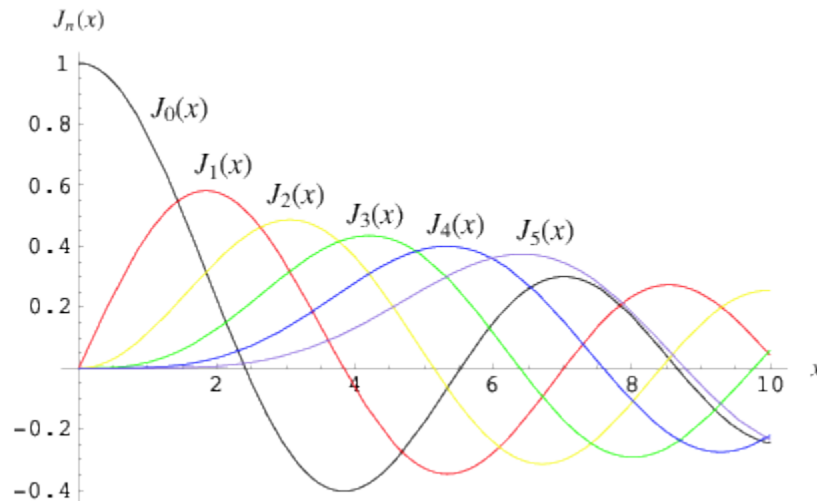# WORKSHEET XIV

POWER SERIES

Bessel functions *may be expressed as power series*

For each of the following power series, determine the *interval of convergence*. Consider end-point behavior as well.

(a) $\displaystyle\sum \frac{x^n}{n^3}$

(b) $\displaystyle\sum_{n=1}^{\infty} \frac{x^n}{n!}$

(c) $\displaystyle\sum_{n=1}^{\infty} \frac{(x-3)^n}{n^2}$

(d) $\displaystyle\sum_{n=1}^{\infty} \frac{(x+5)^n}{(2n+1)}$

(e) $\displaystyle\sum_{n=1}^{\infty} n!\, x^n$

(f) $\displaystyle\sum_{n=1}^{\infty}\frac{3n+5}{2013n+1}(x-1)^n$

(g) $\displaystyle\sum_{n=1}^{\infty}\left(1+\frac{1}{n}\right)^n(x+4)^n$

(h) $\displaystyle\sum_{n=2}^{\infty}\frac{(x-1)^n}{n\ln n}$

(i) $\displaystyle\sum_{n=1}^{\infty}\frac{3^n(x-5)^n}{5^n}$

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

(k) $\displaystyle\sum_{n=1}^{\infty}\frac{n!}{n^n}x^n$

(l) $\displaystyle\sum_{n=1}^{\infty}\frac{nx^{2n}}{1+3^n}$

If people do not believe that mathematics is simple, it is only because they do not realize how complicated life is.

- John von Neumann