

CALCULUS
PROBLEMS LIST 6
12.11.10

(1) Find the radius of convergence of the power series:

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| <p>(a) $\sum_{n=1}^{\infty} \frac{\binom{3n}{n} x^n}{n^2},$</p> | <p>(b) $\sum_{n=1}^{\infty} \frac{2^{n+7} x^{6n}}{\sqrt{n}},$</p> |
| <p>(c) $\sum_{n=1}^{\infty} \frac{(54n+1)^n x^{3n}}{(81n+2)^n},$</p> | <p>(d) $\sum_{n=1}^{\infty} 10^{n^2} x^{n^3},$</p> |
| <p>(e) $\sum_{n=1}^{\infty} n! x^{2^n},$</p> | <p>(f) $\sum_{n=1}^{\infty} \frac{10^n x^n}{n^{10}},$</p> |
| <p>(g) $\sum_{n=1}^{\infty} \frac{x^n}{n 10^{n-1}},$</p> | <p>(h) $\sum_{n=1}^{\infty} 50^n x^{2n+5},$</p> |
| <p>(i) $\sum_{n=1}^{\infty} \frac{x^n}{n(n+1)},$</p> | <p>(j) $\sum_{n=1}^{\infty} \frac{x^{2n}}{\sqrt{n^2+n-n}},$</p> |
| <p>(k) $\sum_{n=1}^{\infty} \frac{4^{n+5} x^{3n+7}}{n 6^{2n}},$</p> | <p>(l) $\sum_{n=1}^{\infty} \frac{(2n)! x^n}{(n!)^3},$</p> |
| <p>(m) $\sum_{n=1}^{\infty} \frac{n!}{n^n} x^{n+7},$</p> | <p>(o) $\sum_{n=1}^{\infty} \binom{4n}{n} x^n,$</p> |
| <p>(p) $\sum_{n=1}^{\infty} n! x^{n^2},$</p> | <p>(q) $\sum_{n=1}^{\infty} \binom{n+10}{n} x^n,$</p> |
| <p>(r) $\sum_{n=1}^{\infty} \frac{n! (3n)!}{(2n)! (2n)!} x^n,$</p> | |

(2) Find the limits:

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| <p>(a) $\lim_{x \rightarrow 7} \left(\frac{1}{x-7} - \frac{8}{x^2-6x-7} \right),$</p> | <p>(b) $\lim_{x \rightarrow 0} x \sin \left(\frac{1}{x} \right),$</p> |
| <p>(c) $\lim_{x \rightarrow 4} \frac{\sqrt{x}-2}{x-4},$</p> | <p>(d) $\lim_{x \rightarrow 3} \frac{x-3}{x+2},$</p> |
| <p>(e) $\lim_{x \rightarrow 5} \frac{x^2-6x+5}{x-5},$</p> | <p>(f) $\lim_{x \rightarrow 1} \left(\frac{1}{1-x} - \frac{3}{1-x^3} \right),$</p> |
| <p>(g) $\lim_{x \rightarrow 1} \frac{x^{2007}-1}{x^{10}-1},$</p> | <p>(h) $\lim_{x \rightarrow 1/2} \frac{8x^3-1}{6x^2-5x+1},$</p> |
| <p>(i) $\lim_{x \rightarrow -2} \frac{x^3+3x^2+2x}{x^2-x-6},$</p> | <p>(j) $\lim_{x \rightarrow 0^+} \frac{x-\sqrt{x}}{\sqrt{x}},$</p> |
| <p>(k) $\lim_{x \rightarrow 1} \frac{(x-1)\sqrt{2-x}}{x^2-1},$</p> | |