

Homework 10 3/18: MATH 112 Prof. Maxwell Auerbach

Show all work. No credit will be given for answers without sufficient work. No calculators are allowed.

Collaboration with classmates is allowed, but all work submitted must be written out and explained by you.

1 Homework 10 Problems: Power Series

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

1.1 a) (11.8.7) $\sum_{n=0}^{\infty} \frac{x^n}{n!}$

1.1 b) (11.8.16) $\sum_{n=0}^{\infty} \frac{(-1)^n (x-1)^n}{(2n-1)2^n}$

1.1 c) (11.8.10) $\sum_{n=0}^{\infty} 2^n n^2 x^n$

1.1 d) (11.8.18) $\sum_{n=0}^{\infty} \frac{\sqrt{n}}{8^n} (x+6)^n$

1.1 e) (11.8.15) $\sum_{n=0}^{\infty} \frac{(x-2)^n}{n^2+1}$

1.2 (11.8.30) 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?

1.2 a) $\sum_{n=0}^{\infty} c_n$

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

1.2 b) $\sum_{n=0}^{\infty} c_n 8^n$

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

Extra Problems 3/18: MATH 112 Prof. Maxwell Auerbach

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2 Extra Problems: Power Series

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

2.1 a) (11.8.4) $\sum_{n=0}^{\infty} \frac{(-1)^n x^n}{\sqrt[3]{n}}$

2.1 f) (11.8.8) $\sum_{n=0}^{\infty} n^n x^n$

2.1 b) (11.8.6) $\sum_{n=0}^{\infty} \frac{(-1)^n x^n}{n^2}$

2.1 g) (11.8.13) $\sum_{n=0}^{\infty} \frac{n}{2^n(n^2 + 1)} x^n$

2.1 c) (11.8.14) $\sum_{n=0}^{\infty} \frac{x^{2n}}{n!}$

2.1 h) (11.8.23) $\sum_{n=0}^{\infty} n!(2x - 1)^n$

2.1 d) (11.8.26) $\sum_{n=0}^{\infty} \frac{x^{2n}}{n(\ln(n))^2}$

2.1 i) (11.8.3) $\sum_{n=0}^{\infty} (-1)^n n x^n$

2.1 e) (11.8.22) $\sum_{n=0}^{\infty} \frac{b^n}{\ln(n)} (x - a)^n, b > 0$

2.1 j) (11.8.21) $\sum_{n=0}^{\infty} \frac{n}{b^n} (x - a)^n, b > 0$

2.2 (11.8.37) A function f is defined by

$$f(x) = 1 + 2x + x^2 + 2x^3 + \cdots$$

that is, its coefficients are $c_{2n} = 1$ and $c_{2n+1} = 2$ for all $n > 0$. Find the interval of convergence of the series and find an explicit formula for $f(x)$.

2.3 (11.8.41) Suppose the series $\sum c_n x^n$ has radius of convergence 2 and the series $\sum d_n x^n$ has radius of convergence 3. What is the radius of convergence of the series $\sum (c_n + d_n) x^n$?