Math 242: HW 11

Due on Thursday, July 31

Summer '14

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Problem 1

Use the ratio test to show that $\sum_{n=1}^{\infty} \frac{(2x)^n}{\sqrt{n}}$ converges absolutely for any $x \in (-\frac{1}{2}, \frac{1}{2})$ (note: this means that the radius of convergence is $\frac{1}{2}$). Now show the interval of convergence is $[-\frac{1}{2}, \frac{1}{2})$ by "checking the endpoints" .

Problem 2

Use the root test to show that $\sum_{n=2}^{\infty} (\ln(x))^n$ converges for any $x \in (\frac{1}{e}, e)$. Now check the endpoints to show that the interval of convergence is $(\frac{1}{e}, e)$. What is the radius of convergence?

Problem 3

Give the interval and radius of convergence of the following series (make sure to check the endpoints of the interval you get from the ratio/root test).

a) $\displaystyle\sum_{n=1}^{\infty} \frac{x^n}{\sqrt{n^2+3}}$

b) $\displaystyle\sum_{n=1}^{\infty} \frac{\sqrt{n}x^n}{3^n}$

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

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

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

Problem 4

Find the Maclaurin series for $f(x) = 2^x$.

Problem 5

Find the Taylor series for $f(x) = e^x$ at $a = 2$.