MATH31B: Week 10

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Question 1. Find the interval of convergence for the following

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

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

Question 2. Expand the function $f(x) = \dfrac{1}{4 + 3x}$ into a powerseries centered at $c = 0$. What is the radius of convergence for this expansion?

Question 3. Using the previous question, find a power series representation of $g(x) = \dfrac{1}{(4 + 3x)^2}$ centered at $c = 0$. What is it's radius of convergence?

Question 4. Find The following Maclaurin series and the interval the expansion is valid by using previously known series.

(a) $f(x) = \dfrac{1 - \cos(x)}{x}$

(b) $f(x) = (x^2 + 1)\sin(x)$

Question 5. Show that

$$\pi - \frac{\pi^3}{3!} + \frac{\pi^5}{5!} - \frac{\pi^7}{7!} + \cdots$$

converges to zero. How many terms must be computed to get within 0.01 of zero?