

Review Worksheet on Sequences and Series
Calculus 3, Fall 2008

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1 Essential Questions

- (a) Determine whether the sequence given by $a_n = \frac{\ln n}{\sqrt{n}}$ is convergent or divergent. If it is convergent, find the limit.
- (b) Determine whether the series $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n+1}}$ is convergent or divergent.
- (c) Determine whether the series $\sum_{n=1}^{\infty} (-1)^{n-1} n^{-1/3}$ is absolutely convergent, conditionally convergent, or divergent.
- (d) Find the values of x for which the series $\sum_{n=1}^{\infty} (\ln x)^n$ is convergent.
- (e) Find the radius and interval of convergence of the series

$$\sum_{n=1}^{\infty} (-1)^n \frac{x^n}{n^2 \cdot 5^n}.$$

- (f) Find the Taylor series about the point $a = 0$ (also called the Maclaurin series) of $f(x) = \arctan(x^2)$, and find its radius of convergence. (Hint: $\frac{d}{dx}(\arctan x) = \frac{1}{1+x^2}$.)
- (g) Find a power series expression for $\int \frac{e^x}{x} dx$.
- (h) Let $f(x) = \frac{1}{1+2x^9}$. Find $f^{(27)}(0)$, i.e. the 27th derivative of f , evaluated at 0. (Hint: Use the Taylor series about 0 for f , and recall that $f^{(n)}(0) = n!c_n$.)
- (i) Do the True-False Quiz in the Review Section at the end of the chapter sequences and series (Chapter 11 in the 6th edition).