



Week 7 Week in Review

courtesy: David J. Manuel

(covering 7.8 and 11.1)

(Problems with a * beside them will also be done in Python)

1 Section 7.8

1. Determine if the following integrals are convergent or divergent, and evaluate if convergent.

(a) $\int_0^1 \frac{1}{\sqrt{x}} dx$

(b) $\int_{-1}^1 \frac{dx}{x^2}$

(c) $\int_1^{\infty} \frac{\ln(x)}{x^2} dx^*$

(d) $\int_1^{\infty} \frac{1}{\sqrt{x^2 + 4x}} dx$

2. Determine if the integral $\int_1^{\infty} \frac{dx}{\sqrt{x} + e^{2x}}$ converges or diverges (with justification), but do not evaluate if convergent.

2 Section 11.1

1. Determine if the following sequences converge or diverge. If they converge, state the limit (with justification). If they diverge, explain why.

(a) $a_n = 2 \ln(3n + 5) - \ln(4n^2 + 1)$

(b) $a_n = (5 + e^n)^{1/(5n)} *$

(c) $a_n = \frac{(-1)^n(2n^2 + 2)}{3n^2 + 1} *$

(d) $a_n = \frac{\sin(n^4)}{n^3}$

(e) $a_n = \frac{(-1)^n n^2}{7n^3 + 1}$



2. Determine if the following sequences are increasing, decreasing, or neither:

(a) $a_n = e^{-n}$

(b) $a_n = \left(-\frac{1}{2}\right)^n$

(c) $a_n = 1 - \frac{1}{n^2}$

3. Determine which of the following sequences are bounded:

(a) $a_n = e^{-n}$

(b) $a_n = \cos(n)$

(c) $a_n = \ln(n)$

4. Given the sequence defined recursively by $a_1 = 2$, $a_{n+1} = 5 - \frac{4}{a_n}$:

(a) State a_2 , a_3 , and a_4 *

(b) Assuming (correctly) that the sequence converges, find the limit.