

MATH 230
11.3

Directions: Show all work on a separate sheet of paper for full credit.

1. Use the Integral Test to determine whether the series is convergent or divergent.

- (a) $\sum_{n=1}^{\infty} n^{-0.3}$ Diverges to ∞
- (b) $\sum_{n=1}^{\infty} n^2 e^{-n^3}$ Converges (Integral converges to $\frac{1}{3}e^{-1}$)

2. Determine whether the series is convergent or divergent.

- (a) $\sum_{n=1}^{\infty} \frac{1}{n\sqrt{2}}$ $\int_1^{\infty} \frac{1}{x\sqrt{2}} dx$ converges. Or Converges by p -test
- (b) $\sum_{n=1}^{\infty} n^{-0.9999}$ $\int_1^{\infty} \frac{1}{n^{0.9999}} dx$ diverges. Or Diverges by p -test
- (c) $\frac{1}{5} + \frac{1}{7} + \frac{1}{9} + \frac{1}{11} + \frac{1}{13} + \dots$ Hint: Write as $\sum_{n=1} \frac{1}{2n+3}$ Diverges to ∞ (IT)
- (d) $1 + \frac{1}{2\sqrt{2}} + \frac{1}{3\sqrt{3}} + \frac{1}{4\sqrt{4}} + \frac{1}{5\sqrt{5}} + \dots$ Hint: Write as $\sum_{n=1} \frac{1}{n^{3/2}}$. Converges (IT)
- (e) $\sum_{n=1}^{\infty} \frac{\sqrt{n} + 4}{n^2}$ Converges (break into 2 integrals. Integrate separately.)
- (f) $\sum_{n=1}^{\infty} \frac{1}{n \ln(n)}$ $\int \frac{1}{x \ln x} dx$. Let $u = \ln x$. Diverges to ∞ (IT)
- (g) $\sum_{n=1}^{\infty} \frac{\ln(n)}{n^2}$ Converges (IT using By Parts). $u = \ln x$, $dv = \frac{1}{x^2} dx$
- (h) $\sum_{n=1}^{\infty} \frac{1}{n^2 + 4}$ Converges (Trig Sub or Use the formula $\int \frac{1}{x^2 + a^2} dx = \frac{1}{a} \tan^{-1}(x/a)$)