Direct Comparison Test Name: Block: Seat:

To prove $\sum a_n$ converges:
find a known convergent series $\sum b_n$, where $0 < a_n \leq b_n$

To prove $\sum a_n$ diverges:
find a known divergent series $\sum b_n$, where $0 < b_n \leq a_n$

1. Consider
$$\sum_{n=1}^{\infty} \frac{1}{n^3+1}$$

2. Consider
$$\sum_{n=1}^{\infty} \frac{n^3}{n^4-1}$$

3. Consider
$$\sum_{n=1}^{\infty} \frac{1}{n\sqrt{n+1}}$$

4. Consider
$$\sum_{n=1}^{\infty} \frac{\sqrt{n}}{n^2+n}$$

5. Consider
$$\sum_{n=1}^{\infty} \frac{e^{5/n^2}}{n}$$

6. Consider
$$\sum_{n=1}^{\infty} \frac{\ln n}{n^4}$$

7. Consider
$$\sum_{n=1}^{\infty} \frac{\sin^3 n}{n^3 + 2n + 1}$$

8. Consider
$$\sum_{n=1}^{\infty} \frac{1}{\ln n}$$

9. Consider
$$\sum_{n=1}^{\infty} \frac{1 + \cos n}{2^n}$$

10. Consider
$$\sum_{n=1}^{\infty} \frac{\ln n}{n^3}$$

11. Consider
$$\sum_{n=1}^{\infty} \frac{n!}{n^n}$$

Answers:
(1) conv $b_n = \frac{1}{n^3}$ (2) div $b_n = \frac{1}{n}$ (3) conv $b_n = \frac{1}{n^{1.5}}$
(4) conv $b_n = \frac{\sqrt{n}}{n^2}$ (5) div $b_n = \frac{1}{n}$ (6) conv $b_n = \frac{n}{n^4}$
(7) conv $b_n = \frac{1}{n^3}$ (8) div $b_n = \frac{1}{n}$ (9) conv $b_n = \frac{2}{2^n}$
(10) conv $b_n = \frac{n}{n^3}$ (11) conv $b_n = \frac{2 \cdot 1}{n \cdot n}$