8.1

Homework # 9, 11, 17, 23, 27, 37, 40

#9. $a_n = 1-(0.2)^n = \boxed{1 \text{ converges}}$

$\lim_{n\to\infty} \quad 1-0=1$

#11.

$a_n = \dfrac{3+5n^2}{n+n^2}$

$\lim_{n\to\infty} = \dfrac{\frac{3+5n^2}{n^2}}{\frac{n+n^2}{n^2}} = \dfrac{\frac{3}{n^2}+\frac{5n^2}{n^2}}{\frac{n}{n^2}+\frac{n^2}{n^2}} = \dfrac{\frac{3}{n^2}+5}{\frac{1}{n}+1} \quad \dfrac{\frac{3}{0}+5}{\frac{1}{0}+1} = 5$

Convergent at 5

#17. $a_n = \dfrac{(-1)^n}{2\sqrt{n}} = \lim_{n\to} a_n = \dfrac{(-1)^n}{2n^{\frac{1}{2}}} = \dfrac{1}{\infty} = 0$ Convergent at 0

#23. $\{n^2 e^{-n}\} \quad \lim_{n\to\infty} \dfrac{n^2}{e^n} = \dfrac{2x}{e^n} = \dfrac{2}{e^n} = \boxed{0 \text{ converges}}$

#27. $a_n = \left(1+\dfrac{2}{n}\right)^n$

$\ln a_n = n\ln\left(1+\frac{2}{n}\right) = \ln a_n = \dfrac{\ln\left(1+\frac{2}{n}\right)}{\frac{1}{n}} = \dfrac{2}{0}$

$\ln x = \lim_{t\to} \dfrac{2}{1+2t} = \ln x = 2$

$e \quad e$

Converges at $= e^2 = x$

8.1 Homework #9, 11, 17, 23, 27, 37, 40

#37. $a_n = \frac{1}{2n+3}$ $\quad a_{n+1} = \frac{\frac{1}{2(n+1)+3}}{\frac{1}{2n+3}} = \frac{2n+3}{2(n+1)+3} =$

$\frac{2n+3}{2n+5}$ $\quad 2n+3 < 2n+5 = \frac{1}{3}$

decreasing

$\lim_{n \to \infty}$ Bounded below by 0.

#40 $a_n = n + \frac{1}{n}$ $\quad n+1 + \left(\frac{1}{n+1}\right) - n + \frac{1}{n} =$

$a_n+1 =$

$1 + \frac{n-(n+1)}{n(n+1} = 1 - \frac{1}{n(n+1)}$

Increasing

$\cancel{n} + 1 + \frac{1}{n+1} - \cancel{n} - \frac{1}{n}$ $\quad 1 + \frac{1}{1} = 2$

$1 + \frac{1}{n+1} - \frac{1}{n}$

Bounded by 2 on bottom

$\lim_{a_n \to \infty} \infty + \frac{1}{\infty} = \infty$