Calculus Section 9.6 Ratio Test
**-Use the ratio test to determine convergence or divergence**

Homework: page 633 #’s 21 – 32

The **ratio test** is a test that determines whether a function converges absolutely.
**Ratio Test**
Let ∑an be a series with nonzero terms.

$$\lim\_{n\to \infty }\left|\frac{a\_{n+1}}{a\_{n}}\right|<1$$

1) ∑an converges absolutely if

$$\lim\_{n\to \infty }\left|\frac{a\_{n+1}}{a\_{n}}\right|>1$$

2) ∑an diverges if

$$\lim\_{n\to \infty }\left|\frac{a\_{n+1}}{a\_{n}}\right|=1$$

3) The Ratio Test is inconclusive if

The Ratio Test is particularly useful for series that converge rapidly (i.e. factorials or exponentials).
 **Example) Determine Convergence or Divergence**

$$\sum\_{n=0}^{\infty }\frac{2^{n}}{n!}$$

$$\sum\_{n=0}^{\infty }\frac{n^{2}2^{n+1}}{3^{n}}$$

1) 2)

3) 4)

$$\sum\_{n=1}^{\infty }(-1)^{n}\frac{\sqrt{n}}{n+1}$$

$$\sum\_{n=1}^{\infty }\frac{n^{n}}{n!}$$