61 $\displaystyle\sum_{n=1}^{\infty} \frac{2^n}{3^n - n} = \frac{2}{2} + \frac{4}{7} + \frac{8}{24}$

$2\left(\frac{2}{3}\right)^n$ will still converge

$\frac{2^n}{3^n - n} \leq 2\left(\frac{2}{3}\right)^n$

$$\frac{\frac{2^n}{3^n}}{\frac{2^n}{3^n - n}}$$

$$\frac{2^n(3^n - n)}{2^n\, 3^n} = \frac{3^n - n}{3^n} = 1 - \frac{n}{3^n} \to 1$$

5-9 $\sum_{n=2} \frac{n}{e^{n^2}}$ $\int_2^\infty \frac{x}{e^{x^2}}\,dx$

$u = x^2$

$du = 2x\,dx$

$\frac{1}{2} \lim_{R\to\infty} \int_1^R \frac{1}{e^u}\,du$

$\int e^{-u}\,du = -e^{-u}$

$\lim_{R\to\infty} \cdot -\frac{1}{2} \cdot \frac{1}{e^u} \Big|_4^\infty$

$-\frac{1}{2}\left(\frac{1}{e^R} - \frac{1}{e^4}\right)$

converges

$$\int \frac{3x^2}{4^{x^3}}\,dx \qquad u = x^3$$

$$du = 3x^2\,dx$$

$$\int \frac{1}{4^u}\,du$$

$$\int 4^{-u}\,du = -\frac{4^{-u}}{\ln 4}\Big|_1^{\infty}$$

$$-\frac{1}{\ln 4}\left(\frac{1}{4^{\infty}} - \frac{1}{4^1}\right) \quad \text{converges}$$

582: 66, 69, 71, 72, 73, 74