Some Identities

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$$lim_{x\to\infty}\frac{B_{2n}}{B_{2n+2}}=\pi^2 \tag{1}$$

$$\pi=\frac{4}{1+\frac{1}{3+\frac{2}{5+\frac{3}{7+\frac{4}{\cdots}}}}} \tag{2}$$

If s(n) = pentagonal numbers such that $s(n)=\frac{3n^2+n}{2}$ the nth partition number is given by

$$p(n)=\sum_{i=1}^{n+1}\sum_{k=1}^{i+1}\sum_{\substack{t=s(-k)\\ \text{step } s(k)-s(-k)}}^{s(k)}\left\lceil\frac{sgn(i-t)+1}{2}\right\rceil(-1)^{k+1}p(\left\lceil\frac{sgn(i-t)+1}{2}\right\rceil)*(n-t)$$

If p(0) = 1.

$$-1+\sqrt{3}=\frac{1}{1+\frac{1}{2+\frac{1}{1+\frac{1}{2+\frac{1}{\cdots}}}}}$$

$$\frac{\sqrt{2}}{2}=\frac{\pi}{4}\prod_{n=1}^{\infty}(1+\frac{4}{n})\prod_{n=-1}^{-\infty}(1-\frac{4}{n})$$