A Brief History of Pi

In each of the following select a digit 0,1,...,9 so that the statement or formula is correct. Each digit should occur exactly once.

A) Definition: For any circle, $\mathrm{A} \times \pi = \dfrac{\text{Circumference}}{\text{Diameter}}$

B) In I Kings 7:23 (circa 950 BC) the value B appears to be used for π.
(Not so erroneous depending on ones interpretation.)

C) Earlier the Babylonians (1900-1680 BC) had used the ratio 2C/8 as a better approximation to π.

D) The Egyptians in the Rhine Papyrus (circa 1650 BC) used $4\left(\frac{\mathrm{D}}{9}\right)^2$ as an approximation to π.

E) In the year 189E, the Indiana House of Representatives passed a bill (#246) patenting such approximations to π with the intent of charging other states for its use. (Fortunately the bill never made it though the senate thanks to the presence of a math professor and π remains in the public domain.)

F) De Moivre (1667-1754) found the elegant formula $e^{i\pi} + 1 = \mathrm{F}$ which relates π, the imaginary unit, the natural log base and the additive and multiplicative identities.

G) Stirling (1692 – 1770) proved that $n! \sim \sqrt{\mathrm{G}\,\pi\, n}\ (n/e)^n$ for large integers n.

The following infinite series have been used to approximate π.

H) $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \ldots = \frac{\pi}{\mathrm{H}}$ (Gregory & Leibnitz, 17th century)

I) $1 + \frac{1}{4} + \frac{1}{9} + \frac{1}{16} + \frac{1}{25} + \ldots = \frac{\pi^2}{\mathrm{I}}$ (Euler, 1735)

J) $\frac{1}{\pi} = \frac{2\sqrt{2}}{\mathrm{J}801} \sum_{k=0}^{\infty} \frac{(4k)!\,(1103+263\mathrm{J}0k)}{(k!)^4\,(3\mathrm{J}6)^{4k}}$ (Ramanujan, 1909)

Series such as Ramaujan's in which each term appears complicated but for which the convergence is rapid have enabled pi to be computed to more than one billion places.