3. We begin by searching/hoping for a nice numerical solution. identify(evalf()) on the
numerator and denominator yields

\[ 4 \pi^{(3/2)} \]

and

\[ 2 \pi^{(3/2)} \]

respectively. This gives an answer of 2. identify() fails to find similar values when one of the
factors is removed or changed, so we should expect that whatever method we shall use to prove
it will not be extensible to the general case.

First, we utilize the Legendre relation by running simplify(mul(GAMMA(1/14+i/7), i=0..6),
GAMMA, trig) to get

\[ 8 \pi^{(7/2)} \]

Knowing that

\[ \Gamma\left(\frac{1}{2}\right) = \sqrt{\pi} \]

we factor it out and find

\[ \Gamma\left(\frac{1}{14}\right) \Gamma\left(\frac{9}{14}\right) \Gamma\left(\frac{11}{14}\right) \Gamma\left(\frac{3}{14}\right) \Gamma\left(\frac{5}{14}\right) \Gamma\left(\frac{13}{14}\right) = 8 \pi^3 \]

Now it suffices to find either the numerator or the denominator, which we do by utilizing the
following special case of the Legendre relation:

\[ \Gamma(x) = \frac{2^{(1/2-2x)}\sqrt{2}\sqrt{\pi}}{\Gamma\left(x + \frac{1}{2}\right)} \Gamma(2x) \]

Strangely, evalb() returns false for this identity, and we conjecture that this is why Maple fails to
simplify the expression as given. Converting the numerator, we obtain:

\[ \Gamma\left(\frac{1}{14}\right) = \frac{2^{(6/7)}\sqrt{\pi} \Gamma\left(\frac{1}{7}\right)}{\Gamma\left(\frac{4}{7}\right)} \]

\[ \Gamma\left(\frac{9}{14}\right) = \frac{2^{(5/7)}\sqrt{\pi} \Gamma\left(\frac{2}{7}\right)}{\Gamma\left(\frac{1}{7}\right)} \]

\[ \Gamma\left(\frac{11}{14}\right) = \frac{2^{(3/7)}\sqrt{\pi} \Gamma\left(\frac{4}{7}\right)}{\Gamma\left(\frac{2}{7}\right)} \]
Multiplying the right-hand sides easily yields
\[ 4 \pi^{(3/2)} \]
which, when divided from our known product gives the expected value for the denominator
\[ 2 \pi^{(3/2)} \]
and therefore,
\[
\frac{\Gamma\left(\frac{1}{14}\right) \Gamma\left(\frac{9}{14}\right) \Gamma\left(\frac{11}{14}\right)}{\Gamma\left(\frac{3}{14}\right) \Gamma\left(\frac{5}{14}\right) \Gamma\left(\frac{13}{14}\right)} = 2
\]