4a) T

b) T

c) T

d) F.

5a) Geometric series $r = -\frac{2}{7}$

$$\Rightarrow \sum_{n=1}^{\infty} \frac{(-2)^n}{7^n} = \frac{\left(-\frac{2}{7}\right)}{1-\left(-\frac{2}{7}\right)}$$

$$= \frac{-2}{9}$$

b) Since $\frac{3^n}{4^{n+2}} = \frac{1}{16} \cdot \frac{3^n}{4^n}$

we have

$$\sum_{n=1}^{\infty} \frac{3^n}{4^{n+2}} = \frac{1}{16} \sum_{n=1}^{\infty} \frac{3^n}{4^n} = \frac{1}{16} \cdot \frac{\left(\frac{3}{4}\right)}{1-\left(\frac{3}{4}\right)}$$

$$= \frac{1}{16} \cdot 3 = \frac{3}{16}$$

c) Write $0.7121212\ldots$

$$= \frac{7}{10} + \frac{1}{10^2} + \frac{1}{10^4} + \frac{1}{10^6} + \cdots$$

$$+ \frac{2}{10^3} + \frac{2}{10^5} + \frac{2}{10^7} + \cdots$$

$$= \frac{7}{10} + \sum_{n=1}^{\infty} \frac{1}{100^n} + \frac{2}{10} \sum_{n=1}^{\infty} \frac{1}{100^n}$$

$$= \frac{7}{10} + \frac{\frac{1}{100}}{1 - \frac{1}{100}} + \frac{2}{10} \cdot \frac{\frac{1}{100}}{1 - \frac{1}{100}}$$

$$= \frac{7}{10} + \frac{1}{99} + \frac{2}{10} \cdot \frac{1}{99}$$

$$= \frac{693}{990} + \frac{10}{990} + \frac{2}{990} = \frac{705}{990}$$

$$= \frac{47}{66}$$