

7. Kamil asks for interest to be added half-yearly to his account. If the bank offers an AER of 4%, find, correct to four significant figures, the equivalent half-yearly rate.

$$\begin{aligned} \text{let } i &= \text{AER} \\ R &= \text{H-YER} \end{aligned}$$

$$(1+R)^2 = (1+i)^1$$

ie. applying the half-yearly rate twice = applying the yearly rate once.

$$\Rightarrow R = \sqrt{1+i} - 1$$

$$R = \sqrt{1.04} - 1$$

$$= 0.0198039$$

$$= 1.98039\%$$

$$\approx 1.980\% \quad (4 \text{ s.f.})$$

12. €50000 is invested in a bank offering an AER of 3.5%. How long will it take this investment to double in value?

$$F = P(1+i)^t$$

$$\frac{F}{P} = (1+i)^t$$

$$\Rightarrow t = \log_{\boxed{1+i}} \boxed{\frac{F}{P}}$$

$$F = 50\,000 (2) = 100\,000$$

$$P = 50\,000$$

$$i = 3.5\%$$

$$t = ?$$

$$t = \log_{1.035} 2$$

$$\approx 20 \text{ years}$$

14. Using (a) trial and error and (b) logs, find how many years it will take €1130 to have a future value of €3000 if invested at 5% per annum compound interest.

$$F = P(1+i)^t$$

trial & error

logs

$$t = \log_{1+i} \left( \frac{F}{P} \right)$$

$$P = 1130$$

$$i = 5\%$$

$$F = 3000$$

$$t = ?$$

$$F_{19} = 1130 (1.05)^{19} = 2855$$

$$F_{20} = 1130 (1.05)^{20} = 2998 \quad \checkmark$$

$$t = \log_{1.05} \frac{3000}{1130} \approx 20 \text{ years}$$