

$$8. (a) \quad F = P \left(1 + \frac{r}{k}\right)^{kt} \quad \begin{cases} P = 100 & F = 1000 \\ r = 10\% = 10 \cdot \frac{1}{100} = .1 \\ k = 4 \end{cases}$$

$$1000 = 100 \left(1 + \frac{.1}{4}\right)^{4t}$$

$$10 = (1 + .025)^{4t}$$

$$10 = (1.025)^{4t} \quad \text{solve for } t$$

$$\ln 10 = \ln[(1.025)^{4t}]$$

$$\ln 10 = 4t \cdot \ln(1.025)$$

$$\frac{\ln 10}{\ln(1.025)} = 4t \frac{\ln(1.025)}{\ln(1.025)}$$

$$4t = \frac{\ln(10)}{\ln(1.025)}$$

$$t = \frac{\ln(10)}{4 \cdot \ln(1.025)} \text{ years (exact answer)}$$

$$t \approx 23.3125 \text{ years to 4 decimal places}$$