**4.** Jason purchases a deferred perpetuity for $ 13,520. The perpetuity has quarterly payments of $ 750. Express the waiting time until the first payment as a function of the annual effective interest rate $i$.

quarterly eff. interest rate:

$$j = (1+i)^{0.25} - 1$$

quarterly eff. disc. rate:

$$d_j = \frac{j}{1+j} = \frac{(1+i)^{0.25} - 1}{(1+i)^{0.25}}$$

$$13520 = 750\,\ddot{a}_{\overline{\infty}|j}(1+i)^{-T}$$

$$13520 = \frac{750}{d_j}(1+i)^{-T}$$

$$\frac{13520\,d_j}{750} = \frac{750(1+i)^{-T}}{750}$$

$$(1+i)^{-T} = \frac{13520\,d_j}{750}$$

$$\log\left[(1+i)^{-T}\right] = \log\left(\frac{13520\,d_j}{750}\right)$$

$$T = \frac{-\log\left(\frac{13520\,d_j}{750}\right)}{\log(1+i)}$$

$$T = -\frac{\log(18.03\,d_j)}{\log(1+i)}$$

$$T = -\frac{\log\left[18.03\left(\frac{(1+i)^{0.25} - 1}{(1+i)^{0.25}}\right)\right]}{\log(1+i)}$$