Samples **Continuous compounding SOLUTIONS**

1. Let F be the final amount he needs, I be the amount he has to invest, r be the interest rate and t be the number of years. Then $F = Ie^{rt}$ so $e^{rt} = \frac{F}{I}$, so $rt = \ln \frac{F}{I}$, and $t = \left(\ln \frac{F}{I}\right) \div r$. Then

$$\begin{aligned} t &= \left(\ln \frac{1920}{800}\right) \div 0.06 \\ &= (\ln 2.40) \div 0.06 \\ &\approx 0.88 \div 0.06 \\ &\approx 14.59 \end{aligned}$$

Hence he needs to invest \$800 for approximately 14.59 years. Therefore Damien can marry Celeste when he is about 34 years old.

2. Let F be the final amount he needs, I be the amount he has to invest, r be the interest rate and t be the number of years. Then $F = Ie^{rt}$ so $e^{rt} = \frac{F}{I}$, so $rt = \ln \frac{F}{I}$, and $t = \left(\ln \frac{F}{I}\right) \div r$. Then

$$\begin{aligned} t &= \left(\ln \frac{2080}{800}\right) \div 0.05 \\ &= (\ln 2.60) \div 0.05 \\ &\approx 0.96 \div 0.05 \\ &\approx 19.11 \end{aligned}$$

Hence he needs to invest \$800 for approximately 19.11 years. Therefore Damien can marry Celeste when he is about 36 years old.

3. Let F be the final amount he needs, I be the amount he has to invest, r be the interest rate and t be the number of years. Then $F = Ie^{rt}$ so $e^{rt} = \frac{F}{I}$, so $rt = \ln \frac{F}{I}$, and $t = \left(\ln \frac{F}{I}\right) \div r$. Then

$$\begin{aligned} t &= \left(\ln \frac{1900}{1000}\right) \div 0.06 \\ &= (\ln 1.90) \div 0.06 \\ &\approx 0.64 \div 0.06 \\ &\approx 10.70 \end{aligned}$$

Hence he needs to invest \$1000 for approximately 10.70 years. Therefore Damien can marry Celeste when he is about 24 years old.