

$$P = \frac{S}{(1+i)^n} = S(1+i)^{-n} \quad \textcircled{2}$$

So, let $S = FV$. Substitute $\textcircled{1}$ into $\textcircled{2}$ to get

$$\begin{aligned} PV = P &= \frac{R((1+i)^n - 1)}{i(1+i)^n} \\ &= \frac{R(1+i)^n}{i(1+i)^n} - \frac{R}{i(1+i)^n} \\ &= \frac{R}{i} - \frac{R}{i(1+i)^n} \\ &= \frac{R}{i} - \frac{R(1+i)^{-n}}{i} \\ &= \frac{R(1 - (1+i)^{-n})}{i} \end{aligned}$$

22. $P = 17\,000$, $a = 325$, $r = 1.006$

$$17\,000 = \frac{325(1.006^n - 1)}{(1.006)^n(0.006)}$$

$$17\,000 = \frac{325(1.006)^n - 325}{(1.006)^n(0.006)}$$

$$102 = \frac{325(1.006)^n}{(1.006)^n} - \frac{325}{(1.006)^n}$$

$$\frac{325}{(1.006)^n} = 325 - 102$$

$$\frac{325}{223} = (1.006)^n$$

$$\log\left(\frac{325}{223}\right) = n \log(1.006)$$

$$n = \frac{\log\left(\frac{325}{223}\right)}{\log(1.006)}$$

$$n = 63$$

23. $P = 7500$, $a = 280$, $r = 1.0095$

$$7500 = \frac{280(1.0095^n - 1)}{(1.0095)^n(0.0095)}$$

$$7500 = \frac{280(1.0095)^n - 280}{(1.0095)^n(0.0095)}$$

$$71.25 = \frac{280(1.0095)^n}{(1.0095)^n} - \frac{280}{(1.0095)^n}$$

$$\frac{280}{(1.0095)^n} = 280 - 71.25$$

$$\frac{280}{208.75} = (1.0095)^n$$

$$\log\left(\frac{280}{208.75}\right) = n \log(1.0095)$$

$$n = \frac{\log\left(\frac{280}{208.75}\right)}{\log(1.0095)}$$

$$n = 31$$

Practice 2.9, page 171

(a) Guy's GIC will be worth \$14 774.55.

```
N=8.00
I%=5.00
PV=-10000.00
PMT=0.00
FV=14774.55
P/Y=1.00
C/Y=1.00
PMT:BEGIN
```

(b) You have to invest \$6315.27 today.

```
N=8.00
I%=6.00
PV=-6315.27
PMT=0.00
FV=8000.00
P/Y=2.00
C/Y=2.00
PMT:BEGIN
```

(c) The future value or amount of the annuity is \$45 301.49.

```
N=40.00
I%=8.00
PV=0.00
PMT=-750.00
FV=45301.49
P/Y=4.00
C/Y=4.00
PMT:BEGIN
```

(d) Gurtrude should deposit \$3305.57 today.

```
N=16.00
I%=3.50
PV=-3305.57
PMT=0.00
FV=3800.00
P/Y=4.00
C/Y=4.00
PMT:BEGIN
```

(e) Trudy would need \$37 936.57 to establish the Retirement Income Fund.

```
N=180.00
I%=5.00
PV=-37936.57
PMT=300.00
FV=0.00
P/Y=12.00
C/Y=12.00
PMT:BEGIN
```

(f) Ramona's bank balance will be \$58 874.59 after 3 years. It therefore earns much more than \$240 in interest every 3 months.

N=12.00
I%=5.00
PV=-53380.00
PMT=240.00
FV=58874.59
P/Y=4.00
C/Y=4.00
PMT:1234 BEGIN

Practise, Apply, Solve 2.10, page 178

1. (a)

$$\begin{aligned}\sqrt{(1+i)^2} &= \left((1+i)^2\right)^{\frac{1}{2}} \\ &= (1+i)^{\frac{2}{2}} \\ &= 1+i\end{aligned}$$

(b)

$$\begin{aligned}\sqrt[4]{(1+i)^4} &= \left((1+i)^4\right)^{\frac{1}{4}} \\ &= (1+i)^{\frac{4}{4}} \\ &= 1+i\end{aligned}$$

(c)

$$\begin{aligned}\sqrt[7]{(1+i)^7} &= \left((1+i)^7\right)^{\frac{1}{7}} \\ &= (1+i)^{\frac{7}{7}} \\ &= 1+i\end{aligned}$$

(d)

$$\begin{aligned}\sqrt[3]{(1+i)^3} &= \left((1+i)^3\right)^{\frac{1}{3}} \\ &= (1+i)^{\frac{3}{3}} \\ &= 1+i\end{aligned}$$

2. (a)

$$\begin{aligned}\sqrt{(1.06)^4} &= (1.06)^{\frac{4}{2}} \\ &= 1.06^2 \\ &= 1.1236\end{aligned}$$

(b)

$$\begin{aligned}\sqrt[3]{(1.08)^{12}} &= (1.08)^{\frac{12}{3}} \\ &= 1.08^4 \\ &= 1.3605\end{aligned}$$

(c)

$$\begin{aligned}\sqrt[4]{(1.0125)^{12}} &= (1.0125)^{\frac{12}{4}} \\ &= 1.0125^3 \\ &= 1.0380\end{aligned}$$

(d)

$$\begin{aligned}\sqrt[2]{(1.04)^{18}} &= (1.04)^{\frac{18}{2}} \\ &= 1.04^9 \\ &= 1.4233\end{aligned}$$

3. (a) $1+i = (1.025)^4$

$$i = (1.025)^4 - 1$$

$$i = 0.1038$$

(b) $1+i = (1.01)^{12}$

$$i = (1.01)^{12} - 1$$

$$i = 0.1268$$

(c) $(1+i)^2 = 1.10$

$$1+i = \sqrt{1.10}$$

$$i = \sqrt{1.10} - 1$$

$$i = 0.0488$$

(d) $(1+i)^{12} = 1.015$

$$1+i = \sqrt[12]{1.015}$$

$$i = \sqrt[12]{1.015} - 1$$

$$i = 0.0012$$

(e) $(1+i)^4 = (1.06)^2$

$$1+i = \sqrt[4]{(1.06)^2}$$

$$i = \sqrt[4]{(1.06)^2} - 1$$

$$i = 0.0296$$

(f) $(1+i)^{12} = (1.025)^4$

$$1+i = \sqrt[12]{(1.025)^4}$$

$$i = \sqrt[12]{(1.025)^4} - 1$$

$$i = 0.0083$$

(g) $(1+i)^{52} = (1.03)^4$

$$1+i = \sqrt[52]{(1.03)^4}$$

$$i = \sqrt[52]{(1.03)^4} - 1$$

$$i = 0.0023$$

(h) $(1+i)^2 = (1.0055)^{52}$

$$1+i = \sqrt{(1.0055)^{52}}$$

$$i = (1.0055)^{26} - 1$$

$$i = 0.1533$$

4. (a) $1+i = (1.04)^2$

$$i = 0.0816$$

$$i = 8.16\%/a$$

(b) $1+i = (1.02)^4$

$$i = 0.0824$$

$$i = 8.24\%/a$$

(c) $1+i = (1.002)^{52}$

$$i = 0.1095$$

$$i = 10.95\%/a$$

(d) $1+i = (1.000\ 24)^{365}$

$$i = 0.0915$$

$$i = 9.15\%/a$$

(e) $1+i = (1.045)^4$

$$i = 0.1925$$

$$i = 19.25\%/a$$

(f) $1+i = (1.0175)^{12}$

$$i = 0.2314$$

$$i = 23.14\%/a$$