**1.**

 FV = $5,000(1.08)10 = $10,794.62

 $10,794.62 – 9,000 = $1,794.62

**2.**

 FV = $2,250(1.10)11 = $ 6,419.51

 FV = $8,752(1.08)7 = $ 14,999.39

 FV = $76,355(1.17)14 = $687,764.17

 FV = $183,796(1.07)8 = $315,795.75

**3.**

PV = $15,451 / (1.07)6 = $ 10,295.65

 PV = $51,557 / (1.13)7 = $ 21,914.85

 PV = $886,073 / (1.14)23 = $ 43,516.90

 PV = $550,164 / (1.09)18 = $116,631.32

**4.**

 FV = $297 = $240(1 + *r*)2; *r* = ($297 / $240)1/2 – 1 = 11.24%

 FV = $1,080 = $360(1 + *r*)10; *r* = ($1,080 / $360)1/10 – 1 = 11.61%

 FV = $185,382 = $39,000(1 + *r*)15; *r* = ($185,382 / $39,000)1/15 – 1 = 10.95%

 FV = $531,618 = $38,261(1 + *r*)30; *r* = ($531,618 / $38,261)1/30 – 1 = 9.17%

**5.**

 FV = $1,284 = $560(1.09)*t*; *t* = ln($1,284/ $560) / ln 1.09 = 9.63 years

 FV = $4,341 = $810(1.10)*t*; *t* = ln($4,341/ $810) / ln 1.10 = 17.61 years

 FV = $364,518 = $18,400(1.17)*t*; *t* = ln($364,518 / $18,400) / ln 1.17 = 19.02 years

 FV = $173,439 = $21,500(1.15)*t*; *t* = ln($173,439 / $21,500) / ln 1.15 = 14.94 years

**6.**

 *r* = (FV / PV)1 / *t* – 1

 *r* = ($290,000 / $55,000)1/18 – 1 = .0968 or 9.68%

**7.**

 FV = $2 = $1(1.07)*t*

 *t* = ln 2 / ln 1.07 = 10.24 years

 The length of time to quadruple your money is:

 FV = $4 = $1(1.07)*t*

 *t* = ln 4 / ln 1.07 = 20.49 years

 Notice that the length of time to quadruple your money is twice as long as the time needed to double your money (the difference in these answers is due to rounding). This is an important concept of time value of money.

**8.**

 *r* = (FV / PV)1 / *t* – 1

 *r* = ($314,600 / $200,300)1/7 – 1 = .0666 or 6.66%

**9.**

 *t* = ln(FV / PV) / ln(1 + *r*)

 *t* = ln ($170,000 / $40,000) / ln 1.053 = 28.02 years

**10.**

 PV = $155,893,400.13

**11.**

 PV = $488.19

**12.**

 FV = $5,083.71

**13.**

 *r* = .0840 or 8.40%

 FV = $1,260,000(1.0840)33 = $18,056,409.94

**14.**

 *r* = .0990 or 9.90%

**15.**

 *r* = – 4.46%

 Notice that the interest rate is negative. This occurs when the FV is less than the PV.

**16.**

 *a.* *r* = .0486 or 4.86%

 *b.* *r*= .0393 or 3.93%

 *c.* *r* = .0548 or 5.48%

**17.**

 PV = $61,303.70

**18.**

 FV = $4,000(1.11)45 = $438,120.97

 FV = $4,000(1.11)35 = $154,299.40

 Better start early!

**19.**

 FV = $20,000(1.084)6 = $32,449.33

**20.**

 *t* = ln($75,000 / $10,000) / ln(1.11) = 19.31

 So, the money must be invested for 19.31 years. However, you will not receive the money for another two years. From now, you’ll wait:

 2 years + 19.31 years = 21.31 years