1. **Problem:** If an item costs \$100.00 today and the inflation rate is 2%, what will the price be in 10 years?

   Solution: We have $P = 100.00$, $i = 0.02$, and $t = 10$. Calculate

   $$\begin{aligned} F &= P(1+i)^t \\ &= 100(1.02)^{10} \\ &= \$121.89. \end{aligned}$$

2. **Problem:** In 1980 the inflation rate was 11.83%. If an item cost \$100.00 in 1980 and if the inflation rate had remained 11.83%, what would that item cost today (2018)?

   Solution: We have $P = 100.00$, $i = 0.1183$, and $t = 38$. Calculate

   $$\begin{aligned} F &= P(1+i)^t \\ &= 100(1.1183)^{10} \\ &= \$305.90. \end{aligned}$$

3. **Problem:** Over the last 10 years, the average rate of inflation has been 1.61%. What is the purchasing power of a dollar today in terms of what a dollar could purchase in 2008?

   Solution: We have $i = 0.0161$ and $t = 10$. Calculate

   $$\begin{aligned} \text{Purchasing power} &= \frac{1}{(1+i)^t} \\ &= \frac{1}{(1.0161)^{10}} \\ &= \$0.85. \end{aligned}$$

4. **Problem:** If a person's salary was \$40,000 in 2008, what should it be today if the person received only a cost-of-living raise each year?

   Solution: Apply the same formula as for prices. (Wages are the *price* of labor.) We have $P = 40,000$, $i = 0.0161$, and $t = 10$. Calculate

   $$\begin{aligned} F &= P(1+i)^t \\ &= 40000(1.0161)^{10} \\ &= \$46,927.19. \end{aligned}$$

5. **Problem:** The average rate of inflation since 1970 is 3.87%. In 1970, a gallon of gas could be bought for as little \$0.25. (You had to shop around.) Today a gallon of gas

can be bought for \$2.21. Has the cost of gas risen faster or slower than the rate of inflation?

Solution: Calculate what the cost of a gallon of gas would be today if it rose at the same rate as inflation. We have $i = 0.0387$, $P = 0.25$, and $t = 48$. Calculate

$$\begin{aligned} F &= P(1+i)^t \\ &= 0.25(1.0387)^{48} \\ &= \$1.55. \end{aligned}$$

Because the current price of \$2.21 is greater than \$1.55, the cost of gas has risen faster than the inflation rate.

6. **Problem:** What is the purchasing power of a dollar today in terms of a 1970 dollar?

   Solution: We have $i = 0.0387$ and $t = 48$. We calculate

$$\begin{aligned} \text{Purchasing power} &= \frac{1}{(1+i)^t} \\ &= \frac{1}{(1.0387)^{48}} \\ &= \$0.16. \end{aligned}$$

7. **Problem:** In 1970, one year of room, board, and tuition at the University or Richmond cost \$1990.00. Today the cost is \$64,890. Has the cost risen faster or slower than the rate of inflation?

   Solution: Calculate what the cost of room, board, and tuition would be today if it rose at the same rate as inflation. We have $P = 1990.00$, $i = 0.0387$, and $t = 48$. We calculate

$$\begin{aligned} F &= P(1+i)^t \\ &= 1990(1.0387)^{48} \\ &= \$12,313.44. \end{aligned}$$

   The cost today is much greater then \$12,313.44, so it has risen much faster than the inflation rate.

8. **Problem:** In 1970, a hand-held calculator that would perform addition, subtraction, multiplication, division, and square roots cost \$400.00. If the price kept pace with inflation, what would that hand-held calculator cost today?

   Solution: We have $P = 400.00$, $i = 0.0387$, and $t = 48$. Calculate

$$\begin{aligned} F &= P(1+i)^t \\ &= 400(1.0387)^{48} \\ &= \$2,475.06. \end{aligned}$$

9. **Problem:** One year of room, board, and tuition at HSC this year costs \$61,170, according to www.collegedata.com. If the inflation rate is 2% for the foreseeable future and if the cost of attending HSC rises at the rate of inflation, what will it cost in 20 years (2038) to attend HSC for one year? For four years (2038-2042)?

   Solution: Calculate the cost separately for each of the four years. For the first year (2038), we have $P = 61,170$, $i = 0.02$, and $t = 20$. We calculate

$$\begin{aligned} F &= P(1+i)^t \\ &= 61170(1.02)^{20} \\ &= \$90,895.40. \end{aligned}$$

   Now each year thereafter, the cost increases by 2%. So for the second year, it is

$$\begin{aligned} F &= 90895.40(1.02) \\ &= \$92,713.31, \end{aligned}$$

   for the third year it is

$$\begin{aligned} F &= 92713.31(1.02) \\ &= \$94,567.58, \end{aligned}$$

   and for the fourth year it is

$$\begin{aligned} F &= 94567.58(1.02) \\ &= \$96,458.93. \end{aligned}$$

   Thus, the total for all four years is \$374,635.22.

10. **Problem:** Room, board, and tuition at the University of Richmond rose at an average annual rate of 7.5% from 1970 to 2018. If the cost continues to rise at that rate, what will *four* years at UR cost beginning 20 years from now?

    Solution: Calculate the cost separately for each of the four years. For the first year (2038), we have $P = 64,890$, $i = 0.075$, and $t = 20$. We calculate

$$\begin{aligned} F &= P(1+i)^t \\ &= 64890(1.075)^{20} \\ &= \$275,643.06. \end{aligned}$$

    Now each year thereafter, the cost increases by 2%. So for the second year, it is

$$\begin{aligned} F &= 275643.06(1.075) \\ &= \$296,316.29, \end{aligned}$$

for the third year it is

$$\begin{aligned} F &= 296316.29(1.075) \\ &= \$318,540.01, \end{aligned}$$

and for the fourth year it is

$$\begin{aligned} F &= 318540.018(1.075) \\ &= \$342,430.51. \end{aligned}$$

Thus, the total for all four years is $1,232,929.87.