3.1.6.

\[ P_{2001} = \$50 \text{ million} \times (1.06) = \$53 \text{ million} \]
\[ P_{2003} = \$50 \text{ million} \times (1.06)^3 = \$59.55 \text{ million} \]
\[ P_{1998} = \$50 \text{ million} \times (1.06)^{-2} = \$44.50 \text{ million} \]

3.2.8.

If you consider the interest rate as an annual interest rate compounded once per year, it’s fine too. Below we use continuous compounding.

At 7%, \( PV = 15000 \times e^{-0.07} = 13,986 \)
At 5%, \( PV = 15000 \times e^{-0.05} = 14,268 \)
At 9.5%, \( PV = 15000 \times e^{-0.095} = 13,641 \)

3.3.4.

Option 1:
Keep the collection which ensures you $3000 after ten years. The cost of this option is the cost fee rising at the continuously compounded rate of 5%.

Cost (at the end of 10th year) = \( 200 \times e^{0.05 \times 10} = 329.75 \)
Net Value (at the end of 10th year) = 3000 − 329.75 = $2670.25

Option 2:
Invest in the stock market, which yields a return of (at the end of 10th year) = \( 1000 \times e^{0.095 \times 10} = 2585.71 \)

Result:
Based on this information keep the collection!

3.3.10.

Given the Cobb-Douglas production function:
\[ Q = 15L^{4/5}K^{1/5} \]

Transform the above function using natural logarithms into a linear function:
\[ \ln Q = \ln(15) + \frac{4}{5} \ln(L) + \frac{1}{5} \ln(K) \]
If \( L = 10 \) and \( K = 5 \), then \( \ln Q = 4.872 \) and \( Q = e^{\ln Q} = 130.6 \)
4.1.2.
(a) Use the condition $x = y$ to get:

$$6z + 3h - 4a + 10 = 4z - h + 6$$

$$\bar{z} = 2a - 2h - 2$$

Use the second equation to figure out $\bar{y}$:

$$\bar{y} = 4\bar{z} - h + 6$$
$$\bar{y} = 8a - 9h - 2$$

Then using the third equation we have $\bar{x} = \bar{y}$ Hence,

$$\bar{z} = 2a - 2h - 2$$
$$\bar{y} = 8a - 9h - 2$$
$$\bar{x} = 8a - 9h - 2$$

(b)

$$\Delta x = 8\Delta a$$
$$\Delta y = 8\Delta a$$
$$\Delta z = 2\Delta a$$

(c)

$$\Delta x = 16$$
$$\Delta y = 16$$
$$\Delta z = 4$$

6.2.8.
For $x_0 = 3$ and $x = 3$, then using the formula for the difference quotient found in the book on page 150, $\frac{\Delta y}{\Delta x} = 34$

(a) When $\Delta x = 1.5$ then $\frac{\Delta y}{\Delta x} = 28$
When $\Delta x = 0.5$ then $\frac{\Delta y}{\Delta x} = 24$

(b) In the limit, as $\Delta x$ approaches zero, $\frac{\Delta y}{\Delta x} = 22$