Problem Set 5: Solutions

1. \[ \frac{1}{1.03^2} (30 + 900) = 876.6 \]

2. (a) The PV of the firm’s “perpetual” obligation = \( \frac{\$2 \text{ million}}{0.04} \) = $50 million.
   (b) Based on the duration of a perpetuity, the duration of this obligation = \( \frac{1.04}{0.04} \) = 26 years.
   Denote by \( w \) the weight on the 5-year STRIP. Then
   \[ 5w + 30(1 - w) = 26 \]
   Solving this gives \( w = 0.16 \). Therefore the pension fund invests:
   0.16 \times $50 million = $8 million in the 5-year STRIP and
   0.84 \times $50 million = $42 million in the 30-year STRIP.

3. On October 31, 2019, 3 month LIBOR was 1.90225 percent. Since fixed is above floating, Mark makes a payment. He pays:
   \[ 0.25 \times 100,000,000 \times (0.0230225 - 0.0190225) \]
   which is $100,000.

4. (a) $20,000 per year.
   (b) 2 percent.

5. See the spreadsheet.
   (a) (i) $16,725,866.
       (ii) 0.7870%.
       (iii) 2.9919%
       (iv) 0.1628
       (v) 85.53%
   (b) (i) $15,043,728.
       (ii) 0.7442%.
       (iii) 2.4550%
       (iv) 0.1809