**Instructions:**

*Please attempt every problem. You must support every solution with an appropriate amount of work and/or description. Unsupported answers may receive a score of 0. Good luck!*

1. (14 pts)The engineering team at Manuel's Manufacturing, Inc., is planning to purchase an enterprise resource planning (ERP) system. The software and installation from Vendor A costs $\underline{\$380,000}$ initially and is expected to increase revenue $125,000 per year every year. The software and installation from Vendor B costs $280,000 and is expected to increase revenue $95,000 per year. Manuel's uses a 4-year planning horizon and a 10% per year MARR.

   (a) What is the present worth of each investment?
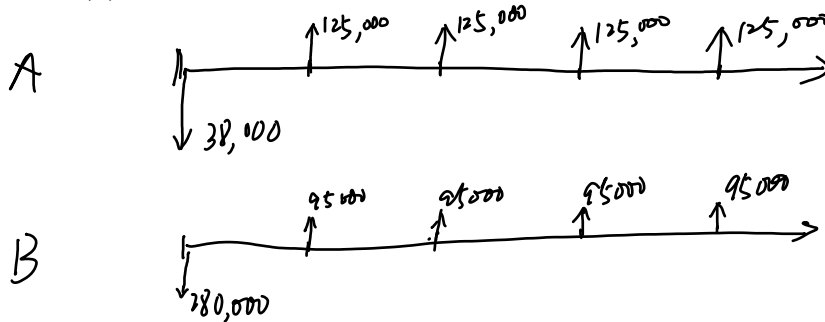


   The present worth of alternative $A$ is

   $$PW_A = -380000 + 125000 \left[ \frac{(1+0.1)^4 - 1}{0.1 \times (1+0.1)^4} \right] = 16233.1808.$$

   +5

   The present worth of alternative $B$ is

   $$PW_B = -280000 + 95000 \times \left[ \frac{(1+0.1)^4 - 1}{0.1 \times (1+0.1)^4} \right] = 21137.2174.$$

   +5

   (b) What is the decision rule for determining the preferred investment based on present worth ranking?
   We choose the alternative with the largest present worth.                +2

(c) Which ERP system should Manuel purchase?

Since $PW_B$ is the largest, Manuel should purchase ERP system from Vendor B.                                                                                    +2

2. (14 pts) DelRay Foods must purchase a new gumdrop machine. Two machines are available. Machine 7745 has a first cost of $10,000, an estimated life of 10 years, a salvage value of $1,000, and annual operating costs estimated at $0.01 per 1,000 gumdrops. Machine A37Y has a first cost of $8,000, a life of 10 years, and no salvage value. Its annual operating costs will be $300 regardless of the number of gumdrops produced. MARR is 6%/year, and 30 million gumdrops are produced each year.
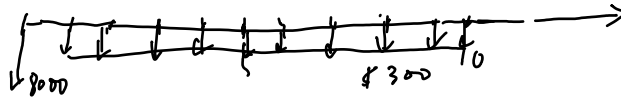
(a) What is the present worth of each machine?

M7745
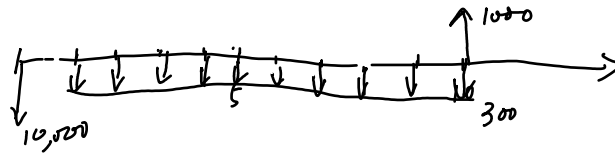


$$\frac{30,000,000}{1000} \times 0.01$$

$$300$$

The present worth of Machine 7745 is

$$PW_1 = -10000 - \frac{30,000,000}{1000} \times 0.01 \times \left[\frac{(1+0.06)^{10} - 1}{0.06 \times (1+0.06)^{10}}\right] + \boxed{1000 \times (1+0.06)^{-10}}$$

$$= -11649.6313.$$

                                                                                    +5

The present worth of Machine A37Y is

$$PW_2 = -8000 - 300 \times \left[\frac{(1+0.06)^{10} - 1}{0.06 \times (1+0.06)^{10}}\right] = -10208.0261.$$

                                                                                    +5

(b) What is the decision rule for determining the preferred machine based on present worth ranking?

We choose the alternative with the largest present worth.                                              +2

(c) Which machine should be recommended?

Since $PW_2 > PW_1$, Machine A37X should be recommended.                                              +2