IOE 452/MFG 455
University of Michigan
Winter 2026
Assignment I
Due: January 19, before 11:59 PM
Electronic submissions only
Ensure that all required materials are attached at the time of submission.

Q1–Suppose you receive **\$100 at the end of each year** for the next **three years.**

1. Draw the timeline clearly indicating the timing and the amount of each cash flow. (5 pts.)

2. Assuming an annual interest rate of 7%, compute the **present value** of these cash flows.(5 pts.)

3. Compute the **future value at the end of year 3** of the present value obtained in part (b). (5 pts.)

4. Suppose you deposit each cash flow into a bank account that earns 7% **annual interest**. What is the account balance at the end of each of the next three years (immediately after each deposit)? Compare the final balance with your answer in part (c). (10 pts.) (10 pts.)

Q2– You are offered the following investment opportunity: If you invest **\$10,000 today**, you will receive **\$500 in one year**, **\$1500 two years**, and **\$10,000 in ten years**.

1. Should you undertake this investment if the annual interest rate is **6%**? Show all calculations. (10 pts.)

2. Should you undertake this investment if the annual interest rate is **2%**? Show all calculations. (10 pts.)

Q3– Suppose you invest **$1,000** at the start of **2026**. Beginning at the start of 2026 and continuing through **2032** (inclusive), you receive **$30 per year**. At the start of **2032**, you also receive a repayment of your initial investment.

Assume a discount rate of **4% per year.**

1. Compute the **discount factor** for each year (including 2026). (10 pts.)

2. Compute the **present value of each cash flow.** (5 pts.)

3. Compute the **net present value (NPV)** of the investment. (10 pts.)

Q4–Suppose that you have **$30,000** in a savings account earning **2% annual interest**.

1. What will be the value of the savings account after **50** years under **simple interest**? (5 pts.)

2. Under **compound interest**, how much interest is earned during years **2, 5, 49, and 50**? (10 pts.)

3. Under **compound interest**, what is the value of the savings account at the end of years **2, 5, 49, and 50**? (10 pts.)

Q5–A company offers to pay you **$30 per year forever** provided you invest **$1,000 today.**

1. What is the **rate of return** on this investment? (10 pts.)

Q6–Consider a one-period project in which a firm invests **$1,000 time** t=0, and and receives **$1,200 at time** t=1. The opportunity cost of capital is **10%**.

1. Compute the **internal rate of return (IRR)** of the project. (10 pts.)

2. Compute the **net present value (NPV)** of the project. (10 pts.)

Q7–A project requires an initial investment of **$6,000 today**. If undertaken, it generates the following cash flows over the next **five periods:**

$$\{\$2,500, \$3,000, \$3,250, \$2,000, \$1,500\}.$$

Assume a discount rate of **8% per period.**

1. Compute the **opportunity cost of investing** after five periods. (5 pts.)

2. Compute the **net future value (NFV)** of the project. (10 pts.)

3. Compute the **present value** of the cash flows. (10 pts.)

4. Compute the **net present value (NPV)** of the project. (5 pts.)

5. Based on your calculations, explain whether the project should be accepted or rejected. (5 pts.)

Q8–A piece of equipment can be built immediately at a cost of **\$1,000**. Once built, it generates **\$100 per period forever.**

1. Should the equipment be built if the interest rate is **9% per period?** Justify your answer. (10 pts.)