3.1. **Payoff and profit curves for a user of goods.**

**Problem 3.1.** Assume that the total fixed revenue of a **purchaser** of a certain good is given as $R$. Try to come up with an example of this situation.

**Solution:** Answers will vary.

One possibility is: Starbucks needing to buy caramel to put on pretty much everything they make these days. The prices of caramel in the market may vary, but Starbucks will not alter their revenue, i.e., the prices they charge for drinks, depending on the changes of the market price on a particular day.

**Problem 3.2.** The market price of the good is the independent argument $s$. Draw the graph of the purchaser’s payoff and profit as a function of $s$.

![Graph of payoff and profit curves](image-url)
3.2. Basic risk management.

**Definition 3.1.** A function $f : \mathbb{R} \to \mathbb{R}$ is said to be *increasing* if for every $x < y$ we have $f(x) \leq f(y)$. A function $f : \mathbb{R} \to \mathbb{R}$ is said to be *decreasing* if for every $x < y$ we have $f(x) \geq f(y)$.

**Definition 3.2.** We say that a portfolio is *long with respect to a certain asset* if its payoff function is increasing as a function of that asset’s final price. We say that a portfolio is *short with respect to a certain asset* if its payoff function is decreasing as a function of that asset’s final price.

3.3. Forward contracts.

**Problem 3.3.** *Source: Sample FM(DM) Problem #10.*

Suppose stock XYZ has a current price of 100. The forward price for delivery of this stock in 1 year is 110. Also, assume there are no dividends, and that the annual effective interest rate is 10%, unless otherwise indicated (in the sequel).

Which of the following statements is **FALSE**?

A. The time−1 profit diagram and the time−1 payoff diagram for long positions in this forward contract are identical.

B. The time−1 profit for a long position in this forward contract is exactly opposite to the time−1 profit for the corresponding short forward position.

C. There is no comparative advantage to investing in the stock versus investing in the forward contract.

D. If the 10% interest rate were continuously compounded instead of annual effective, then it would be more beneficial to invest in the stock, rather than the forward contract.

E. If there was a dividend of 3.00 paid 6 months from now, then it would be more beneficial to invest in the stock, rather than the forward contract.

**Solution:** See Lecture #3.