Homework 4
Solutions

The solutions below are commented extensively so that you can get insights into how to reason when solving similar problems. Even if you had to present full solutions on paper you would not be expected to provide anything remotely similar in order to get full score. Very concise, correct solutions would be perfectly acceptable.

1 Problem 1

This was not really a "problem," just an acknowledgment that one will abide by Cornell's rules of academic integrity.

2 Problem 2

Which one of the following is an example of a sunk cost?

Answer:

The obvious answer is "$2,000 paid last year to rent equipment."

3 Problem 3

Cerda Diagnostics spent $5,000 last week repairing equipment. This week the company is trying to decide whether the equipment could be better utilized by assigning it to a proposed project. When analyzing the proposed project, the $5,000 should be treated as which type of cost?

Answer:

This is an example of a sunk cost.

You may have noted that "erosion" was listed as one of the possible answers. It is not uncommon for multiple-choice questions to feature some options that are meant as a distraction for unprepared candidates. It is a useful (but not fail-safe) exam-taking heuristic to assume that terms that have not been discussed in class are less likely to be answers. Of course, it is possible that such terms were introduced in assigned readings or other relevant materials, so the presence of such options is also an implicit invitation for the problem solver to review course materials and/or do a bit of research on terminology. A simple web search using terms like "cash flow project analysis erosion" provides an instant answer to what erosion is.

4 Problem 4

A project is expected to generate annual revenues of $116,100, with variable costs of $74,200, and fixed costs of $14,700. The annual depreciation is $3,750 and the tax rate is 21 percent. What is the annual operating cash flow?

Answer:

We compute EBIT:

$$\begin{aligned} EBIT &= (Sales) - (Fixed\,costs) - (Variable\,costs) - (Depreciation) \\ &= 116,100 - 14,700 - 74,200 - 3,750 \\ &= \$23,450. \end{aligned}$$

The tax applicable to this EBIT amount is $Tax = (EBIT) \cdot (tax\,rate) = 23,450 \cdot 0.21 = \$4,924.50$. We can now compute OCF:

$$\begin{aligned} OCF &= (EBIT) - (Taxes) + (Depreciation) \\ &= 23,450 - 4,924.50 + 3,750 \\ &= 22,275.50. \end{aligned}$$

The answer that we got is not listed, but we have a choice that comes very close ($22,276); in fact, this is the answer that we got rounded to the nearest dollar.

5 Problem 5

Myers Storage purchased a parcel of land four years ago at a cost of $112,600. Today, the land has a market value of $136,600. At the time of the purchase, the company spent $8,400 to grade the land and another $11,500 to install electrical access. The company now wants to build a new facility on the site at an estimated cost of $522,700. What amount should be used as the initial cash flow for this project?

Answer:

In this problem we encounter both opportunity costs and sunk costs. Within the context of the problem, it does not matter how much Myers Storage paid for the land, and how much they paid for improvements to the land. What matters is that the land is now worth $136,000. An alternative use of the land is to sell it. If we do the project, we (obviously) do not sell the land, so we give up on this alternate opportunity. It thus seems reasonable to account $136,000 as an opportunity cost that should burden the project.

To get the initial **incremental** cash flow for the project we reason like this: we give up the opportunity to make \$136,000 **and** we spend \$522,700 to build the new facility. Our total cost is thus 522,700+136,600=\$669,300, which is the answer that we choose.

If you think carefully about this problem and you also remember your accounting course(s), you may articulate a few related concerns. For example, is it legitimate to allocate an opportunity cost of \$136,600 to the land, when there would likely be taxes and fees to be paid on the sale, which will reduce the net cash inflow from the sale? If you posed this question, you would be right - the problem ignores these issues. Why? Mainly, to keep things simple. Most problems that we study in this introductory course rely on heavy simplifications of reality. It is a good problem-solving strategy to always focus on what is explicitly given to you and ignore the complexity that has been silently suppressed (ignored) in order to make the problem more manageable. When solving problems during the exam, do not get lost in unnecessary complexity!

6 Problem 6

Lou Construction is looking at a new system with an installed cost of \$411,500. This cost will be depreciated straight-line to zero over the project's seven-year life, at the end of which the system is expected to be sold for \$35,000 cash. No bonus depreciation will be taken. The system will save the firm \$129,400 per year in pretax operating costs, and the system requires an initial investment in net working capital of \$22,500. All of the net working capital will be recovered at the end of the project. The tax rate is 23 percent and the discount rate is 13.2 percent. What is the net present value of this project?

Answer:

This is a cost-saving project. We solved the problem on worksheet "Problem 6" of the attached Excel workbook. The NPV shown on the worksheet is \$84,117.66, which is very close to one of the choices offered (\$84,117.64). We choose this answer.

7 Problem 7

A proposed three-year project will require \$589,000 for fixed assets, \$79,000 for inventory, and \$43,000 for accounts receivable. Accounts payable are expected to increase by \$47,000. The fixed assets will be depreciated straight-line to a zero book value over five years. No bonus depreciation will be taken. At the end of the project, the fixed assets can be sold for \$225,000. The net working capital returns to its original level at the end of the project. The operating cash flow per year is \$67,900. The tax rate is 21 percent and the discount rate is 12 percent. What is the total cash flow in the final year of the project?

Answer:

We solve the problem on worksheet "Problem 7" of the attached Excel workbook; note that we provided a full analysis, providing much more information than the problem actually requested. We compute the cash flow at the end of year 3 to be $370,126, which is the answer that we choose.

8 Problem 8

Russell's is considering purchasing $697,400 of equipment for a four-year project. The equipment falls in the five-year MACRS class with annual percentages of .2, .32, .192, .1152, .1152, and .0576 for Years 1 to 6, respectively. At the end of the project the equipment can be sold for an estimated $135,000. The required return is 13.2 percent and the tax rate is 23 percent. Assuming no bonus depreciation is taken, what is the amount of the after-tax salvage value of the equipment?

Answer:

We solve the problem of worksheet "Problem 8" of the attached workbook. We get that the after-tax salvage value (cash flow) resulting from the sale of the equipment is $131,667.47, which is the answer that we choose.