**Quiz Problems for Chapters 5 and 6**

1. Your company, International Widget Manufacturers, is headquartered in New Orleans, but is considering expanding its operations to the west coast. It will cost $10 million to build a plant in California to make widgets, but if you do, you will be able to sell 1.5 million widgets per year for the next ten years. The project ends at that time. During the first year, your widgets will be priced at $1.00 each. They will cost 30 cents each to make. Both the price of the widgets and their cost of production are expected to increase at the rate of 3 percent per year over the next ten years. This is also the expected rate of inflation. The cost to build the plant will be fully expensed in the year it is built. IWM is in the 21 percent marginal tax bracket, and its cost of capital is 13%. What is the NPV of this project?
2. Green Wave Inc. is considering an investment of $250,000 in an asset with an economic life of five years. The firm estimates that the annual cash revenues and expenses at the end of the first year will be $200,000 and $100,000, respectively. Revenues are expected to grow thereafter at a rate of 5 percent per year while expenses are expected to grow by 3% per year. Green Wave will use the straight-line method to depreciate its asset to zero over five years. There is no salvage value. A net working capital investment of $10,000 is required immediately, along with an additional $5,000 at the end of the first year. They will both be recovered at the end of the project. Green Wave has a marginal tax rate of 21%. What is the IRR of the project?
3. The New Orleans Mosquito Control Corporation (NOMCC) has hired you as a consultant to evaluate the NPV of their proposed frog ranch. NOMCC plans to breed long-tongue frogs and sell them as ecologically desirable mosquito-control mechanisms in the hopes of eliminating the West Nile Virus. They anticipate that the business will continue in perpetuity. Following negligible start-up costs, NOMCC will incur the following nominal cash flows at the end of the year.

Revenues $150,000

Labor costs 75,000

Other costs 20,000

The company will lease machinery from a firm for $10,000 per year. (The lease payment starts at the end of year 1.) The payments of the lease are fixed in nominal terms. Sales will increase at 5 percent per year in real terms. Labor costs will increase at 3 percent per year in real terms. Other costs will increase at 1 percent per year in real terms. The rate of inflation is expected to be 1.5 percent next year. The real cost of capital for revenues and costs is 10 percent. The lease payments are risk-free: therefore, they must be discounted at the risk-free rate. The real risk-free rate is 2 percent. There are no taxes. All cash flows occur at year-end. What is the NPV of NOMCC’s proposed frog ranch today?

1. Franco’s athletic club is planning an expansion. The owner is either going to build a completely new building or just add on to the existing facility. A new building will cost $10 million, but it is expected to increase revenues by $2 million (before taxes) per year for ten years. An add-on to the current facility will only cost $500,000, but projections are that it will lead to an increase in revenues of only $150,000 (before taxes) per year for ten years. The capital outlay for either choice will be depreciated on a straight-line basis over the ten-year life of the project. Cash flows from depreciation tax savings should be considered to have the same risk as other cash flows. Franco’s Athletic Club has a marginal tax rate of 21% and a cost of capital of 10%. Find the IRR of each project, the incremental IRR, and determine which type of an expansion to recommend to the owner.
2. Your company is considering the purchase of Robinstats Inc. Robinstats is not publicly traded, so you need to discount its free cash flows to come up with a purchase price. You have the following information about Robinstats. Remember that all cash flows come at the end of the year.

* Revenues are expected to be $6 million this year
* Variable costs are expected to be $3 million this year
* Fixed costs are expected to be $1.5 million this year
* Revenues are expected to grow at 10% per year for two years (years 2 and 3) before settling into a constant growth of 3% per year forever
* Variable costs are expected to grow at 3% per year forever
* Fixed costs are expected to remain at $1.5 million per year forever
* If you acquire Robinstats, you will inherit two years of depreciation write-offs of $500,000 per year (years 1 and 2). There is no risk associated with these write-offs, so discount the tax shield they create at the risk-free rate.
* The marginal corporate tax rate is 21%
* Your cost of capital is 12%
* The risk-free rate is 3%

What is the value of Robinstats Inc.?

1. Sustef Corporation is considering replacing a machine. The replacement will cut operating expenses by $24,000 per year for each of the five years the new machine is expected to last. Although the old machine has a remaining useful life of five years, it only has two years of depreciation left on its schedule ($10,000 per year). If the new machine is purchased, the old machine would be immediately sold for an amount equal to its book value. The new machine will cost $72,000 which will be depreciated over its expected life (no salvage value). Sustef is subject to a 21% tax rate on ordinary income and has a cost of capital of 12 percent. Calculate the NPV of replacing the old machine with the new one.
2. The treasurer of Amaro Canned Fruits, Inc. has projected the cash flows of projects A, B, and C as follows. The relevant discount rate is 12 percent. These projects are mutually exclusive

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Project A | Project B | Project C |
| 0 | -$90,000 | -$190,000 | -$90,000 |
| 1 | 70,000 | 130,000 | 75,000 |
| 2 | 70,000 | 130,000 | 60,000 |

Compute the NPV and IRR for each of the three projects and determine which you will do.

1. LAM corporation is considering buying some software from IBM to help with the online sales from its website. The software package costs $850,000 and will be fully expensed in the year that it is purchased. It is predicted that the purchase of this software will directly result in an increase in sales of $500,000 during the first year it is used, and the increased sales will grow at a rate of 4% per year during years two, three, four, and five. It is expected that this software will be obsolete and need to be upgraded after five years. Cost of goods sold and operating expenses for LAM are 25% of sales each year. The additional business resulting from the software means that LAM needs an increase in net working capital of $25,000 immediately. This additional net working capital will be recovered in full at the end of the fifth year. The corporate tax rate for LAM is 21% and the required rate of return on it is 18%. What is the NPV and the IRR for the purchase of the new software?
2. Sustef Enterprises has been considering the purchase of a new manufacturing facility for $1.2 million. The cost of the facility is to be depreciated on a straight line basis over seven years. It is expected to have no value after seven years. Cash flows from depreciation are considered to be risk-free, so they should be discounted at the risk-free rate. Operating revenues from the facility are expected to be $500,000 during the first year. The revenues are expected to increase by 3 percent per year during the seven-year life of this facility. Production costs during the first year are $200,000, and they are expected to remain at that level. Of course, projected revenues and costs are only projections, so they could be higher or lower than what we project. The appropriate discount rate for risky cash flows is 11%, while the riskless interest rate is 2%. The corporate tax rate is 21%. What is the NPV of this investment?
3. A proposed project requires no working capital, but it does need an initial investment of $200,000 which can be depreciated to a value of zero on a straight-line basis for five years. During those five years, sales are expected to grow at a rate of 20% per year, starting with $100,000 during the first year. At the end of the five years, sales are expected to only grow at 3% per year in perpetuity. Expenses are expected to be $40,000 during the first year and are expected to grow at a rate of 3% in perpetuity immediately thereafter. The firm’s marginal tax rate is 21% and investors require an 18% rate of return on projects with this level of risk. What is the net present value of this project?