

Name (Printed) _____

Class Time -
(circle)

9:00 a.m.

11:00 a.m.

Instructions

1. Read these instructions and wait until you are told to begin before starting work on this test.
2. When time is called, stop work immediately. Continuing to work after time has been called will be considered a violation of the Honor Code.
3. If you have questions during the test period, raise your hand and someone will come to answer your question as quickly as possible.
4. This test is open book, open notes. Be sure to show all work. **All work must be shown to receive full or partial credit.**
5. If you complete the test prior to the end of the test period, please bring your test to the front of the room and place it in the appropriate stack (recitation section), face down.
6. This test has 8 questions. Check to see if you have a complete test.

Honor Pledge

I pledge I have neither given nor received any unauthorized assistance on this test.

Signed: _____

1 acre = 43,560 ft²; 1 ton = 2,000 lbs.; 8 quarts = 1 peck; 1 mile = 5,280 ft.

Do Not Write Below This Line (Office Use Only) _____

Question 1 _____ Question 4 _____ Question 7 _____

Question 2 _____ Question 5 _____ Question 8 _____

Question 3 _____ Question 6 _____ Total Score _____

Question 1 (12 points)

A company is considering investing \$10,000 in a heat exchanger. The heat exchanger will last 5 years, at which time it will be sold for \$2,000. The maintenance cost at the end of the first year is estimated to be \$1,000. Maintenance costs for the exchanger are estimated to increase by \$500 per year over its life. As an alternative, the company may lease the equipment for \$X per year, including maintenance.

6 pts (a) Draw a cash flow diagram of both alternatives.

6 pts (b) For what value of X should the company lease the heat exchanger? The company expects to earn 8% on its investments. Assume end-of-year lease payments.

Answer

Question 2 (15 points) Clearly circle "T" (for True) or "F" (for False) for each of the following statements.

- a. T F Cash flows normally include depreciation since it represents a cost of doing business.
- b. T F A certain loan involves monthly repayments of \$185 over a 24-month period. If $r = 12\%$ per year, more than half of the principal is still owed on this loan after the tenth monthly payment is made.
- c. T F \$1,791 ten years from now is equivalent to \$900 now if the interest rate equal 8% compounded annually.
- d. T F Income taxes are based on a company's taxable income.
- e. T F If i (expressed as a decimal) is added to the series capital-recovery factor, the series sinking-fund factor will be obtained.
- f. T F The $(P/A, i\%, N)$ factor equals $N \cdot (P/F, i\%, 1)$.
- g. T F When considering mutually exclusive alternatives, the best alternative is one that maximizes incremental rate of return on investment.
- h. T F Evaluations involving long time spans and high interest rates are generally insensitive to changes in salvage value.
- i. T F In a mutually exclusive set of alternatives, one or more of the alternatives out of the group can be chosen.
- j. T F For a fixed amount, $\$F$, that is received at EOY N , the annual equivalent increases as the interest rate increases.
- k. T F The book value of a depreciable asset is that amount which has been charged off as a depreciation expense.
- l. T F The internal rate of return before income taxes is independent of the depreciation method used.
- m. T F An investment of \$6,000 yields a return of \$1,500 at the end of each of the next four years. The internal rate of return on this investment is zero percent.
- n. T F The principle which is basic in choosing among mutually exclusive alternatives is that the total investment as well as each increment of investment have an acceptable internal rate of return. Assume this is an investment decision.
- o. T F A future worth (computed at the MARR) greater than zero for a project guarantees that interest in excess of the MARR has been realized by the project.

Question 3 (10 points)

As a graduation present, your parents offer you two alternatives:

Alternative A: \$2,000 cash June 1 (EOM_0)

Alternative B: \$150 June 1 and \$100 per month for 20 months beginning July 1 (EOM_1)

(a) At what monthly internal rate of return are the two alternatives equivalent?

Answer

(b) Assume that you think that the rate of return you calculated in part (a) is too low. Which alternative should you pick? Explain why.

Question 4 (15 points)

A company uses a variable speed honing machine to increase the smoothness of the inside walls of hydraulic jacks. The hone uses acid-dipped "brushes" to perform this operation. Increasing the speed of the machine results in faster operation, but reduces brush life. A single "brush" costs \$90.00 and can be refurbished several times before its useful life is over. (The number of refurbishings depends on the honing speed.) Each refurbishing costs \$30.00. Assume a refurbished brush can smooth the same amount as a new brush, and that when purchased a new brush is ready to use. The operating cost for the hone and operator is \$70.00/hr. Below is the data for operating the hone at 3 different speeds. The time required for changing brushes is incorporated into the honing rates below.

(HINT: find the cost per jack, not per hone or per cycle!!)

Honing Speed (rpm)	Hone Rate (jacks/hr)	# of jacks polished until brush needs refurbished	# of times refurbishing is possible
180	7	12	4
240	10	8	2
300	12	6	1

Which honing speed is most economical?

Question 5 (12 points)

Not having had a contract or a "hit" during the last 12 months, Itchy "Fingers" Valachi, the Mafia's chief executioner, needs a loan to pay off the bills his wife has run up at Penney's. He goes to his pal "Hammerhead" the loan shark who loans him \$10,000 for a year. "Hammerhead" tells Itchy, "Since you're my best friend I'm only going to charge you 20% per year so that you will pay only \$2,000 interest for the loan. Of course, I want you to pay the principal plus interest (\$12,000) back in 12 equal end-of-month payments of \$1,000. If you don't make the payments on time you will be dropped into a vat of acid." Happily, Itchy replies "Thanks Hammerhead, you're a pal." What kind of pal is Hammerhead? (Give a quantitative evaluation -- what is true effective interest rate per year?)

Answer

Question 6 (24 points)

A company with an effective income tax rate and a capital gains tax of 40% and a $MARR_{AT}$ of 12% must choose from 2 mutually exclusive projects:

	<u>ALT 1</u>	<u>ALT 2</u>
Initial Cost	\$11,000	\$33,000
Uniform Annual Benefit	3,000	9,000
Depreciation Method	Straight Line	MACRS
Depreciable Life	3 years	3 years
IRS approved salvage value for depreciation purposes	2,000	0
Useful Life	5 years	5 years
Actual market value at end of useful life	2,000	2,000

Determine which project should be selected by using present worth analysis.

Answer

Question 7 (5 points)

If you purchase a house for \$100,000 by getting a 30 year mortgage with monthly payments using 6% per year compounded monthly, what is your monthly payment?

Answer

Question 8 (7 points)

For the following asset, compute the double (200%) declining balance depreciation schedule.

Cost of asset, P	\$10,000
Useful (and depreciable) life, N	4 years
Salvage value at end-of-year N	\$0