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| **EGR 310**  **Midterm Exam Retake**  **Email Version**  **Study Notes**  **1.** A cash flow with an arithmetic gradient increases or decreases by a fixed amount each time period. |

**2.** When applying the economic decision-making process, one of the main reasons companies do not audit their results is because of the cost to do the audit.

**3.** The cost of raw material to produce your product is considered a variable cost. The cost of raw material is proportional to the amount of product you make. Therefore, it is considered a variable cost.

**4.** The accuracy of a cost estimate increases as the cost of producing the cost estimate increases.

**5.** The Tax-Cuts and Job Act (TCJA) of 2018 reduced the corporate tax rate to 21% flat rate.

**6.** A firm won a fixed price contract to install IT equipment for the county of San Diego. The firm's economic criterion for performing the contract should be to minimize input. Since the contract is fixed price, the firm should be focused on minimizing input which will produce the most profit for the firm.

**7.** You have been given a budget of $2500 to put on a children's fair in your community. The economic criterion you should use is to maximize output. Since the budget is fixed (input), what you want to do id get the most for your money (maximize outputs)

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**8.** A philanthropist set up a trust to provide $10,000 scholarships annually to deserving students. How much needs to be deposited today at 5% interest to ensure the $10,000 scholarships are paid every year forever?

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| Investment needs to produce enough to provide scholarships forever.  Interest needs to cover the costs.  Answer Key  Deposit \* (.05) = $10,000  Deposit = $ |

**9.** WYSWYG manufacturing is deciding which of 2 pieces of equipment to invest. Both produce the same output quantity. Both pieces of equipment have a 5-year life. If the firm's interest rate is 6%, what is the present value of the cost of each alternative and which alternative has the lowest present value of the cost?

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| Alternative | A | B |
| Initial Cost | $8,000 | $10,000 |
| Annual Cost | $300 | $500 |
| Salvage Value after 5 years | $0 | $3,000 |

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| Answer Key |  |
| Pres. cost of option A = $8,000 + $300 \* (P/A, 6%, 5) =……….  Pres. cost of option B = $10,000 + $500 \* (P/A, 6%, 5) - $3,000 \* (P/F, 6%, 5)  =  Option ………… has the lowest present cost | |

**10.** A production facility can produce 1,000 units per year. Fixed costs are $60,000 per year and the variable cost is $3 per unit produced. If the facility produced 600 units, what is the average cost of producing the 600th unit?

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| Answer Key |  |
| Average cost = total cost / number produced | |

**11.** What deposit needs to be made today at 8% annual nominal interest compounded monthly to ensure $1,000 is in the account 15 years from now?

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| Answer Key |  |
| Monthly rate = (0.08/12)  Total number of periods = 15 years \* 12 months/yr =……..  ……….= Deposit \* (1 + (0.08/12))180 | |

**12.** The maintenance cost of a machine is $150 after one year and increases by 6% each year. Using an interest rate of 6%, what is the present cost of maintenance if the machine is maintained for 10 years?

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| Answer Key |  |
| P = 150 \* 10 \* (1 + 0.06)^(-1) =…….. | |

**13.**A young woman plans to retire in 30 years. She intends to contribute the same amount of money at the end of each year to her retirement fund. The fund earns 10% compounded annually. She would like to withdraw $100,000 each year for 20 years, starting 1 year after the last contribution is made. Approximately how much money should she contribute to her retirement fund each year?

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| Answer Key |  |
| First compute how much she needs in 30 years to get $100,000 per year  for 20 years.  PV (at 30 years) = $100,000 \* (P/A, 10%, 20) =……..  Use that value as future value of annuity  A = ……….. \* (A/F, 10%, 30) = | |

**14.** Kathy needs to replace the 1000-ft2 heat exchanger she purchased 6 years ago with a 3000-ft2 heat exchanger . If she purchased the 1000-ft2 heat exchanger for $5,000 6 years ago, estimate the cost of the 3000-ft2 heat exchanger today if the power sizing exponent is 0.6 and the cost index for compressors 6 years ago was 150 and today it is 210.

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| Answer Key |  |
| Use power sizing model to estimate cost of 3,000-ft2 heat exchanger  6  years ago.  (3,000/1,000)^(.6) \* 5,000) =………  Use cost index to estimate cost today  (210/150) \* 9,667 =………   or  Use cost index first to get estimated cost of 1000-ft2 heat exchanger today  (210/150)\*5,000 =…………  Use power sizing model to estimate cost of 3000-ft2 heat exchanger today  (3,000/1,000)^(0.6) \* 7,000 =………. | |

**15.** A bank pays a nominal annual interest rate of 12% compounded quarterly. What is the effective interest rate?

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| Answer Key |  |
| 12% compounded quarterly. 12/4 = …………..per quarter  Effective rate = (1 + .03)4) - 1 = ………..  **16.** In your own words, explain what is the “life-cycle” cost:  Use the definitions in the text | |

**17.** Present worth analysis is a technique to compare multiple economic alternatives by converting current and future cash flows of each alternative into an equivalent current amount of money.

**18.** A cash flow diagram illustrates the timing, sign of the cash flows, and their size.

**19.** The marginal cost is a variable cost of one more unit to be produced.

**20.** A pharmaceutical company has invested $3,000,000 the past 3 years in a new drug to slow the advancement of memory loss. The $3,000,000 is an example of sunk cost.

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|  | The $3,000,000 is a sunk cost (a cost that has already been paid and cannot be undone. |

**21.** A cruise ship charges $4,000 per person for an all-inclusive weeklong trip in the Caribbean. The weekly operations, maintenance and fuels costs for the ship are $80,000 and the weekly staff wages are $60,000. The food and support costs are $1500 per week per passenger. How many passengers are required for the ship to break even?

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| Answer Key |  |
| X = number of passengers  Revenue = $4000 \* X  Cost = Fixed cost + Variable cost  Fixed cost = $80,000 operations, main and fuel costs + $60,000 weekly  staff wages = $140,000  Variable cost = $1500 \* X  Break even when cost = revenue  $4000 \* X = $140,000 + $1500 \* X  X =\_\_\_\_\_\_\_\_\_\_\_\_\_ passengers | |

**22.** A trust will pay you $50,000 per year for 30 years starting 1 year from now. Assuming an interest rate of 5% compounding annually, what is the present value of these cash flows worth?

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| Answer Key |  |
| P = $50,000(P/A, 5%, 30) = $50,000(15.372) = …………… | |

**23.** A 40-year-old consulting engineer wants to set up a retirement fund to be used starting at age 65. $20,000 is invested now and an additional $4000 per year every year until retirement at 6% compounded annually. Approximately how much money will be in the fund at retirement?

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| Answer Key |  |
| Future value of a sum deposit today plus an annuity  for 65 - 40 = 25 years.  FV = $20,000 \* (F/P, 6%, 25) + $4000 \* (F/A, 6%, 25)        =………………. | |