Instructions:

- Please fill in your name, ID number and check your section number: E (1-2:30pm) or F (2:30-4pm)
- The exam lasts 80 minutes. It consists of five questions. Please answer all of them.
- Credit for a question is exactly in proportion to the time recommended.

<table>
<thead>
<tr>
<th>Question</th>
<th>Points (minutes)</th>
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<tbody>
<tr>
<td>1</td>
<td>18</td>
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<td>2</td>
<td>12</td>
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<td>3</td>
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<td>4</td>
<td>12</td>
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<td>5</td>
<td>18</td>
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<td><strong>Total</strong></td>
<td><strong>80</strong></td>
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- You are allowed one $8\frac{1}{2}” \times 11”$ sheet of formulas and one calculator.
- Answer these questions without consulting anyone.
- Use the space provided. If more space is needed, use the other side.
- Be neat and show your work. Answers without work receive no credit. Wrong answers with partially correct work may receive partial credit.
- Allocate your time optimally.

Good luck!
1. (18 Minutes) True, false or “it depends”? Give a brief explanation for each answer.

(a) “Managers should maximize the firm’s current market value, but only when maximization does not create unacceptable risks for shareholders.”

(b) “The cost of capital of a firm decreases with the amount of cash it has in hand.”

(c) “Term structure of interest rates must be always upward sloping because longer maturity bonds are riskier.”
(d) “Bonds with higher coupon rates have more interest rate risk.”

(e) “PV is sometimes calculated by discounting free cash flow for several years, say from year 1 to $T$, and then discounting a forecasted terminal value at horizon date $T$. The choice of the horizon date can have a significant effect on PV, particularly for rapidly growing firms.”

(f) “When we choose between two alternative projects, the one with the higher IRR always dominates.”
2. (12 minutes)

The Wall Street Journal gives the following prices for STRIPS (with a principal of 100):

<table>
<thead>
<tr>
<th>Bond</th>
<th>Maturity Year</th>
<th>Price</th>
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<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>95.92</td>
</tr>
<tr>
<td>B</td>
<td>2</td>
<td>92.01</td>
</tr>
<tr>
<td>C</td>
<td>3</td>
<td>87.00</td>
</tr>
</tbody>
</table>

(a) Determine the 1-, 2- and 3-year spot interest rates from the given prices.

(b) Compute the annual forward rate from year two to year three, i.e., \( f_3 \) (or \( f_{2,3} \)).

(c) Compute the yield to maturity of a 2-year coupon bond with a principal of 100 and a coupon rate of 4.25%. Assume annual coupon payments.
3. (20 minutes)

As a mid-size company, you have a pension plan which pays out $10 million a year forever. The first payment is exactly one year from now. The term structure is currently flat at 5%.

(a) Compute the present value of your pension liabilities.

(b) Suppose that the interest rate goes down by 0.1%. How does the value of your liability change?

(c) Given your answer to (b), what is the modified duration of your pension liability?

(d) Suppose that the pension plan is fully funded (i.e., the value of your assets equal the value of pension liabilities). You want to invest all your assets in bonds to avoid any interest rate risk. What should the duration of your bond portfolio be?

(e) Suppose that this portfolio is a single zero-coupon bond. What should its maturity and total par value be?
MW Co. expects earnings of $1.25 per share next year, out of which $0.50 will be paid out as dividends. Earnings and dividends are expected to grow at a constant rate $g$ each year afterwards. MW shares are now traded at $20. The cost of capital for MW Co. is 10%.

(a) What is the expected growth rate of earnings $g$?

(b) What is the ROE for MW?

(c) Is MW a growth company? Justify your answer.
5. (18 minutes)

You are running a start-up company, MyWay. MyWay was launched last year with an initial capital expenditure of $10 million. You expect to spend another $10 million this year. The company is expected to generate a pre-tax profit of $2 million next year, which is then going to grow at 5% every year afterwards. Googol Inc., another company, is interested in buying MyWay. You need to figure out a baseline valuation for MyWay. You also have the following information:

- Capital expenditure can be depreciated linearly for 4 years (straight-line depreciation), starting next year.
- Tax rate is 30%.
- Googol is a mature company with a P/E ratio of 10.
- Mature companies in the same business as MyWay have a P/E ratio of 8.

(Mature companies are assumed to have zero growth.)

(a) Compute after-tax cash flows for MyWay.
(b) Find the appropriate discount rate to value MyWay’s assets.
(c) Compute the value of MyWay.