Grade 11
Essential Math 30S

Final Exam

January 2014
1. You deposit $5,000 in the bank. Find the simple interest earned if the interest rate is 2.75% and you leave it in the bank for 8 months. (2 marks)

\[ 5000 \times 0.0275 \times \left( \frac{8}{12} \right) = 91.67 \]

2. Calculate the total in your bank account at the end of a year if you deposit $3,000 at an interest rate of 2.00%, compounded semi-annually. (3 marks)

\[ 3000 \times 0.02 \times 0.5 = 30 \]
\[ 3030 \times 0.02 \times 0.5 = 30.30 \]
Total = $3060.30

3. A friend said they put $7,000 in the bank and three years later had earned $750 in interest. Calculate the interest rate with two decimals. (2 marks)

\[ r = \frac{I}{P \times t} = \frac{750}{7000 \times 3} = 3.57\% \]

4. You invest $6,000 into your local credit union for six years. The interest rate is 2.65%, compounded monthly. Calculate the interest earned. (3 marks)

\[ A = P \left( 1 + \frac{r}{n} \right)^{nt} \]
\[ 6000 \times \left( 1 + \frac{0.0265}{12} \right)^{72} \]
\[ = 7032.79 \]
\[ = 6000 \]
\[ \underline{1032.79 \text{ interest}} \]
5. Gregory wants to borrow $14,200 to buy a used car. The Royale Bank is offering him an interest rate of 7.50%. Gregory needs to decide between a 3-year or a 6-year loan.

   a) Calculate Gregory’s monthly loan payment if he chooses the 3-year loan with a rate of 7.50%. Use a loan payment table. (3 marks)

   \[ \frac{14200 \times 31.11}{1000} = \$441.76 \]

   b) Calculate Gregory’s monthly loan payment if he chooses the 6-year loan with a rate of 7.50%. Use a loan payment table. (3 marks)

   \[ \frac{14200 \times 17.29}{1000} = \$245.52 \]

   c) Calculate the total interest paid with the 3-year loan. (2 marks)

   \[ 441.76 \times 3 \times 12 = 15903.36 \]

   \[ -14200 \quad \frac{1703.36 \text{ interest}}{10} \]

   d) Calculate the total interest paid with the 6-year loan. (2 marks)

   \[ 245.52 \times 6 \times 12 = 17677.44 \]

   \[ -14200 \quad \frac{3477.44 \text{ interest}}{10} \]
6. Help Gregory (from question above) decide whether to get a 3-year or a 6-year loan. Use the table below: (4 marks)

<table>
<thead>
<tr>
<th></th>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-year</td>
<td>less interest</td>
<td>higher monthly</td>
</tr>
<tr>
<td>loan</td>
<td></td>
<td>payment</td>
</tr>
<tr>
<td>6-year</td>
<td>lower monthly</td>
<td>more interest</td>
</tr>
<tr>
<td>loan</td>
<td>payment</td>
<td></td>
</tr>
</tbody>
</table>

7. The owner of the Winnipeg Jests sells the team and then invests the $50,000,000 at a rate of 2%. How many years will it take the owner to double his investment? (1 mark)

\[
\frac{72}{2} = 36 \text{ years.}
\]
8. Sara-Jane's monthly credit card statement has a previous balance of $747.28. Sara-Jane made a payment of $400 during the month and purchased more goods totaling $411.34. Assume her interest charges for the month are $33.15.

a) Calculate Sara-Jane's new balance. (3 marks)

\[
747.28 - 400 + 411.34 + 33.15 = 791.77
\]

b) Calculate Sara-Jane's minimum monthly payment if it is 5% of her balance or $15, whichever is greater. (1 mark)

\[
\frac{791.77 \times 0.05}{39.59} > 15
\]

9. Complete the following chart that compares several different sources of credit when getting a loan. (3 marks)

<table>
<thead>
<tr>
<th></th>
<th>Bank or Credit Union</th>
<th>Credit Card like Visa or MasterCard</th>
<th>In-Store Credit (ex. Best Buy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest Rate</td>
<td>7%</td>
<td>19.99%</td>
<td>29.99%</td>
</tr>
</tbody>
</table>
10. You are purchasing a hot tub from Tubs R Us and have two payment options: Cash or Installment Plan. The hot tub you want has a sticker price of $3,199.99.

a) Calculate the price of the hot tub if you paid cash. Assume 8% PST and 5% GST is added to the sticker price. (2 marks)

\[
3199.99 \times 1.13 = \$3615.99
\]

b) Calculate the total paid if you choose the installment plan. (2 marks)

<table>
<thead>
<tr>
<th>Tubs R Us – Installment Plan (no taxes at all!)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Money Down</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td>$199</td>
</tr>
</tbody>
</table>

\[
199 + (349 \times 12) = \$4387
\]

\[
199 + 4188 = \$4387
\]

(3 marks)

(c) What is the carrying charge (extra) when paying by installment? (1 mark)

\[
4387 - 3615.99 = \$771.01
\]
11. In the previous question you calculated the price of both the cash purchase and the installment plan purchase.

   a) Use your answer in c) above to calculate the interest rate if you would choose the installment plan. (2 marks)

   \[
   \frac{771.01}{3615.99} \times 100 = 21.30\%
   \]

   b) What advantage, if any, is there to using an installment plan instead of paying cash? (1 mark)

   If rate is low, payments vs lump sum

12. After researching credit cards online and watching several videos, what would you say are the two most important things you learned about credit cards? (2 marks)
13. Tom has no money in his bank account and needs to pay his rent today. He gets paid in two weeks. Payday Loan charges a fee of $20 for every $100 borrowed. After two weeks, Tom must pay back what he owes plus the fee.

a) If Tom borrows $500, how much will he need to pay back in two weeks? (3 marks)

\[ 500 + (20 \times 5) = \$600 \]

b) What percent interest did Tom pay when borrowing money from Payday Loan? Hint: It is more than 20%. (2 marks)

\[ \frac{100}{500 \times (2/5)} = 5.2 \times 100 = 520\% \]

14. Explain the difference between a deficit and surplus budget situation. (1 mark)

- **Deficit** - Not enough $.
- **Surplus** - Extra $. 

15. Give an example of an expense that occurs every month but is not the exact same amount. Explain why this is so. (1 mark)

   groceries
   fuel

   prices change.

16. Why is making a conservative budget (expenses rounded up and income rounded down) a good idea? Explain. (1 mark)

   no surprises if expenses change.

17. Underestimating expenses can have disastrous results. How can you be sure your expenses are accurate? (1 mark)

   keep track for a few months.

18. You have spent some time planning your budget. Give an example of an unexpected expense that would require you to pay more than you had budgeted. (1 mark)

   car repair
   ticket
19. Mandy earns $4,700 every month before deductions.

   a) What is Mandy’s gross pay? (1 mark)

      $4,700

   b) If Mandy’s deductions are 33% of her gross pay, calculate her deduction amount. (2 marks)

      \[ 4700 \times 0.33 = 1551 \text{ ded.} \]

   c) Calculate Mandy’s net pay. (1 mark)

      \[ 4700 - 1551 = 3149 \]

   d) How much money should Susan put aside every month for savings if she follows the recommended guidelines? (2 marks)

      \[ 0.10 \times 3149 = 314.90 \]

      \[ 4700 \]
20. Martin spends $675.00 on food every month and this accounts for 35% of his net monthly income. How much should Martin spend on food to bring his monthly percentage down to 25%? (3 marks)

\[
\frac{35}{100} = \frac{675}{x} = 1928.57 \\
x \cdot 0.25 = 482.14
\]

21. John makes $62,000 per year and his wife Mary makes $800 weekly.

a) Calculate their combined annual income. (2 marks)

\[
62000 + (800 \times 52) \\
= 103600
\]

b) How much is their combined monthly income for budget purposes? (1 mark)

\[
103600 \div 12 = 8633.33
\]
22. Write out a cheque to The Bulk Bin for $53.75. Date it with today's date and sign your name. (2 marks)

23. Find the measure of the missing angle. Show your work. (1 mark)

24. Find the missing side in the triangle below: (2 marks)
25. Find the missing angles and side in the triangle below:

\[ A = \cos^{-1}\left(\frac{205}{350}\right) = 54.1^\circ \]
\[ B = \sin^{-1}\left(\frac{205}{350}\right) = 35.9^\circ \]
\[ a = \sqrt{350^2 - 205^2} = 283.7 \]

A = (2 marks)
B = (2 marks)
a = (2 marks)

26. A tree casts a shadow that is 230 feet long. The angle of elevation to the sun is 37°. How tall is the tree? (2 marks)

\[ \tan(37) = \frac{x}{230} \]
\[ x = 173.3 \text{ feet} \]
27. From the top of a 1356 meter building, the angle of elevation to the top of another building is 38°. The angle of depression to the bottom of the second building is 24°. How tall is the second building? (5 marks)

\[ \tan(27°) = \frac{75}{\text{adj}} \]  
\[ \text{adj} = 147.196 \]  
\[ \tan(49°) = \frac{\text{opp}}{147.196} \]  
\[ \text{opp} = 169.3 \]  
\[ 75 + 169.3 = 244.3 \]
28. Jeffrey has purchased several turtles at the pet store and wants to build a turtle tank along the wall in his living room. He needs to build a tank that is 12 feet long by 4 feet wide and 5 feet high.

a) Draw a net of the turtle tank and label it appropriately. (2 mark)

b) Calculate the surface area of the glass needed to build the tank if there is no top. (3 marks)

\[20 + 60 + 20 + 60 + 48 = 208 \text{ ft}^2\]

\[208 \times 11.99 \times 1.13 = \$2818.13\]

(c) Calculate the price of the glass plus taxes. Glass is sold for $11.99 a square foot. PST is 8% and GST is 5%. (3 marks)
29. Danny has a summer job painting at a high school. He is asked to paint a cafeteria that is 32 feet wide and 84 feet wide. The walls are 10 feet high. All four walls need paint.

a) What is the total surface area that he must paint? (3 marks)

b) A one-gallon can of the paint that Danny is using covers approximately 350 ft\(^2\). If Danny applies 2 coats of paint, how many cans of paint should he buy? (3 marks)

\[
\frac{2320 \times 2 \text{ coats}}{350} = 13.3 \quad \text{or} \quad 14 \text{ cans}
\]
30. A grain stockpile cover in the shape of a cone has a diameter of 68 feet and a height of 30 feet.

a) How much material is needed for the cover? (3 marks)

\[ A = \pi rs \]
\[ = \pi \cdot 34 \cdot 45.3 \]
\[ = 4838.7 \text{ ft}^2 \]

b) Convert your material area to square yards. (2 marks)

\[ 4838.7 \text{ ft}^2 \]
\[ \approx 537.6 \text{ yd}^2 \]
31. A pet store pours its bulk cat food into a cylindrical bin 120 cm high and with a diameter of 70 cm.

a) What volume of cat food does the bin hold? (3 marks)

\[ V = \pi r^2 h \]
\[ = \pi \cdot 35^2 \cdot 120 \]
\[ = 461814 \text{ cm}^3 \]

b) What is the volume of the bin in litres? (1 mark)

\[ \frac{461814}{1000} = 461.8 \text{ L} \]

c) The pet store orders cat food in large 40-kg sacks. Each sack is approximately 35 cm wide, 90 cm long, and 25 cm thick. Calculate the volume of a cat food sack. (2 marks)

\[ 35 \times 90 \times 25 = 78750 \text{ cm}^3 \]

d) How many sacks of cat food fit in the bin? (1 mark)

\[ \frac{461814}{78750} = 5.86 \]
5 for sure
32. The pet store buys a new bin with dimensions 2 times as large as the original in the above question. What is the volume of the new bin? (2 marks)

\[ 2^3 \text{ bigger} \]
\[ 369,451.2 \text{ cm}^3 \]

33. Bob buys a sandwich every day for lunch at the cafeteria. Instead of buying a sandwich every day for $2.75, he wants to make his own.

A jar of sandwich spread is $3.29 and should last 8 weeks.
A container of margarine is $4.99 and should last 8 weeks.
A package of sandwich meat is $3.99 and should last one week.
A loaf of bread is $3.49 and should last one week.

Assume each week above is a 5 day work week.

a) Calculate the cost of a sandwich if Bob makes it on his own.

\[ \frac{3.29}{(8 \times 5)} = \frac{0.8225}{1} = 0.8225 \]
\[ \frac{4.99}{(8 \times 5)} = \frac{0.12475}{1} = 0.12475 \]
\[ \frac{3.99}{5} = \frac{0.798}{1} = 0.798 \]
\[ \frac{3.49}{5} = \frac{0.698}{1} = 0.698 \]

\[ \$1.70 \]

b) How much money does Bob save in a year if he makes his own sandwiches? (3)

\[ 2.75 - 1.70 = 1.05 \text{ / day} \]
\[ \times 5 \]
\[ \times 52 \]

\[ \$1273 \]
Essential Math 305 – Final Exam

34. A water tower at the University of Texas is filled with water. The water fills the bottom half-sphere portion and the middle cylinder portion but does not fill the cone shaped portion. If the water tower has a diameter of 30 meters and the wall height of the cylinder is 38 meters, calculate the capacity of the water tower in litres. (5 marks)