Dawson College: **Business Mathematics**: 201-801-DW Group 10: Winter 2008

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Test 1

This test is graded out of 55 marks. No books, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. *(2 marks)* Write the percent 0.3% into a fraction and into a decimal.

0.003 , $\frac{3}{1000}$

Question 2. *(1 mark)* Reduce the fraction $\frac{56}{60}$ to lowest terms.

$\frac{14}{15}$

Question 3. *(1 mark)* Bring the fraction $\frac{2.25}{5.5}$ to higher terms to eliminate the decimals.

$\frac{9}{22}$

Question 4. *(3 marks)* Simplify the following:

$$8\left[\frac{(2(4^2)-2(4-3)}{3^4-1}\right]+2$$

$$= 8\left[\frac{2(16)-2}{81-1}\right]+2$$

$$= 8\left[\frac{32-2}{80}\right]+2$$

$$= \frac{30}{10}+2 \quad = 3+2 = 5$$

Question 5. *(3 marks)* Simplify the following:

$$5(2-yx)(x+y+1)-(2-a)(x+y)$$

$$= 5[(2-yx)(x+y+1)] - [(2-a)(x+y)]$$

$$= 5[2x+2y+2-x^2y-xy^2-xy] - [2x+2y-ax-ay]$$

$$= [10x+10y+10-5x^2y-5xy^2-5xy] - 2x-2y+ax+ay$$

$$= 8x+8y+10-5x^2y-5xy^2-5xy+ax+ay$$

Question 6. *(2 marks)* Expand the following:

$(x-1)(x+y+z-1)$ $= x^2+xy+xz-x-x-y-z+1$

$= x^2+xy+xz-2x-y-z+1$

Question 7. *(3 marks)* Simplify the following:

$\frac{x^2(x^2y)^3y^{-2}}{(x^2y^{-1})^3}$ $= \frac{x^2(x^6y^3)}{x^6y^{-3}y^2}$

$= \frac{x^8y^3y^3}{x^6y^2}$

$= x^2y^4$

Question 8. *(2 mark)* Evaluate the following to two decimal places:

$\ln(e^6(1.2))$ $= \ln e^6 + \ln 1.2$

$= 6\ln e + \ln 1.2$

$= 6 + \ln 1.2$

$\doteq 6.18$

Question 9. *(1 mark)* Rewrite the exponential $6^2 = 36$ as a logarithm.

$\log_6 36 = 2$

Question 10. *(1 mark)* Rewrite the logarithm $\ln 1 = 0$ as an exponential.

$e^0 = 1$

Question 11. *(1 mark each)*
Evaluate the following to two decimal places:

1. $\sqrt{191} \doteq 13.82$
2. $123^{\frac{2}{3}} \doteq 24.73$
3. $\frac{1-2^{-1}}{3} \doteq 0.17$
4. $\sqrt{18}-5.8723 \doteq -1.63$

Question 12. *(4 marks)*
Let $r = 0.035$, $S = 2150$, $P = 201$. Solve for t and evaluate t to two decimal places:

$$S = P\left[1-\frac{rt}{365}\right]$$

$$\frac{S}{P} = \left[1-\frac{rt}{365}\right]$$

$$\frac{rt}{365} = 1-\frac{S}{P}$$

$$t = \frac{365}{r}\left(1-\frac{S}{P}\right)$$

$$t = \frac{365}{(0.035)}\left(1-\frac{2150}{201}\right)$$

$$t \doteq -101\,120.82$$

Question 13. *(2 marks)*
Let $PMT = 211$, $i = 0.04$, $n = 36$, evaluate FV to two decimal places:

$$FV = PMT\left[\frac{(1+i)^n-1}{i}\right]$$

$$= 211\left[\frac{(1+0.04)^{36}-1}{0.04}\right]$$

$$= 16\,373.24$$

Question 14. *(3 marks)*
Solve for x:

$$1+5(x+2)+(x-7)-(x-1)=3(4x-2)$$

$$1+5x+10+x-7-x+1 = 12x-6$$

$$11 = 7x$$

$$\frac{11}{7} = x$$

Question 15. *(3 marks)*
Solve for x:

The LCD of $\frac{2}{5}, \frac{3}{7}, \frac{7}{20}$ is 140

$$\frac{2}{5}(3x-2)-\frac{3}{7}(5x-2)=\frac{7}{20}-x$$

$140\left(\frac{2}{5}\right)(3x-2) - 140\left(\frac{3}{7}\right)(5x-2) = 140\left(\frac{7}{20}\right) - 140x$

$56(3x-2) - 60(5x-2) = 49 - 140x$

$168x - 112 - 300x + 120 = 49 - 140x$

$-41 = -8x$

$\frac{41}{8} = x$

Question 16. *(2 marks)*
Change the ratio 28 : 56 : 98 to lower terms.

28 : 56 : 98
14 : 28 : 49
2 : 4 : 7

Question 17. *(2 marks)*
Change the ratio 3.1 : 8.2 : 11.1 to higher terms to eliminate the decimals of each proportion.

3.1 : 8.2 : 11.1
31 : 82 : 111

Question 18. *(4 marks)*
John the farmer decides to sell part of his land to help his financial situation. He sells two lots one of $2\frac{1}{2}$ and the other of $3\frac{1}{4}$ hectares at a price of \$15 000 per hectare. He then sells an additional lot of $5\frac{1}{4}$ hectare at a price of \$10 000 per hectare. How much will John obtain from the sale of the lots?

amount from sales $= \left(2\frac{1}{2} + 3\frac{1}{4}\right)15000 + 5\frac{1}{4}(10000)$

$= \left(\frac{5}{2} + \frac{13}{4}\right)15000 + \frac{21}{4}(10000)$

$= 86\ 250 + 52\ 500$

$= \$138\ 750$

∴ John will obtain \$138 750.

Question 19. *(4 marks)*
Jean opens a savings account with zero interest at his favorite bank. He makes an initial deposit of \$3000 on January 1st, he withdraws \$1 200 on April 1st, he deposits \$500 on August 1st, he deposits \$700 on October 1st. What was Jean average monthly balance of his savings account for the year?

Balance of Account	#months
3000	3
1800	4
2300	2
3000	3

average monthly balance

$= \dfrac{(3000)3 + 1800(4) + 2300(2) + 3(3000)}{12}$

$\therefore = \$2483.33$

Question 20. *(4 marks)*
Emilie and Yann are getting insured at their new appartment. The insurance cost \$654.00. They agree that the cost will be divided in a ratio of four to five and that Emilie will pay more. How much money will Yann pay for the insurance?

ratio 4:5 $\therefore$ # parts is 9

Emilie will pay $= \frac{5}{9}(654) = \$363.33$

Yann will pay $= \frac{4}{9}(654) = \$290.67$

Question 21. *(4 marks)*
If a business has a net income of \$1 820 000 that is split between its three investor in the ratio $\frac{1}{5} : \frac{1}{6} : \frac{1}{7}$, how much will each investor receive?

The LCD of $\frac{1}{5}, \frac{1}{6}, \frac{1}{7}$ is 210. We bring the ratio to higher terms by multiplying with the LCD. 42:35:30 and the total # parts is 107.

$\therefore$ the first investor will get $\frac{42}{107}(1\,820\,000) = \$714\,392.52$

the second investor will get $\frac{35}{107}(1\,820\,000) = \$595\,327.10$

the third investor will get $\frac{30}{107}(1\,820\,000) = \$510\,280.37$

Bonus Question *(2 marks)*
Isolate n (i.e. solve for n).

$$FV = PMT\left[\frac{(1+i)^n - 1}{i}\right]$$

$$\frac{FV}{PMT} = \left[\frac{(1+i)^n - 1}{i}\right]$$

$$\frac{i \cdot FV}{PMT} = (1+i)^n - 1$$

$$\frac{i \cdot FV}{PMT} + 1 = (1+i)^n$$

$$\ln\left(\frac{i \cdot FV}{PMT} + 1\right) = n \ln(1+i)$$

$$\frac{\ln\left(\frac{i \cdot FV}{PMT} + 1\right)}{\ln(1+i)} = n$$