FINAL EXAMINATION - FALL 2011

Department of Mathematics, Dawson College

2:00 - 5:00pm, Dec. 21st 2011

201-943-DW: Applied Mathematics for Electronics Engineering

Examiner: Emilie Richer

Name: ______________________________

Student ID: ______________________________

Instructions:

- Print your name and student ID number in the space provided above.
- All questions are to be answered directly on the examination paper in the space provided. If you need more space for your answer use the back of the page.
- No books, notes, graphing calculators, programmable calculators or electronic devices are permitted.
- SHOW ALL YOUR WORK. Show all your work clearly and justify all your answers.
- Verify that your final examination copy has a total of 17 pages including this cover page.

Question	# Marks	
1	6	
2	4	
3	4	
4	5	
5	3	
6	4	
7	5	
8	5	
9	5	
10	4	
11	6	
12	30	
13	5	
14	6	
15	4	
16	4	
Total	100	

Question 1. *(6 marks)*

Simplify the given expressions. Express the results with positive exponents only.

a. $\left(\dfrac{2^3 a^{-2} b^{\frac{1}{2}}}{2^{-2} a^4 b^{-\frac{5}{2}}}\right)^{-2}$

b. $\dfrac{(3t)^{-1}}{3t^{-1}}$

c. $\dfrac{(nRT^{-2})^{32}}{R^{-2}T^{32}}$

Question 2. *(4 marks)*
Solve the given equation. Check that your answer(s) are in fact solutions of the equation.

$\log x + \log(11 + 6x) = 1$

Question 3. *(4 marks)*
Solve the given quadratic equation in **two different ways**.

$$y = 18x^2 - 21x - 4$$

Question 4. *(5 marks)*

Consider the equation $y = \log_2(x+1)$.

a. Give the exponential form of the equation.

b. Graph the function $y = f(x) = \log_2(x+1)$

c. Give the domain and range of the function $f(x) = \log_2(x+1)$

Question 5. *(3 marks)*
If $f(x) = 2\log_b x$ and $f(8) = 3$ find $f(4)$.

Question 6. *(4 marks)*
The current i (in A) in a certain electric circuit is given by $i = 16(1 - e^{-}$

Question 7. *(5 marks)*
Solve the following system of equations.

$x+3y+z=4$

$2x-6y-3z=10$

$4x-9y+3z=4$

Question 8. *(5 marks)*

Find the four solutions of the given equation that lie in the range $0^\circ \leq \theta$

Question 10. *(4 marks)*
Perform the indicated operation and simplify your answer.

$$\frac{\frac{3}{x}+\frac{1}{x^2+x}}{\frac{1}{x+1}-\frac{1}{x-1}}$$

Question 11. *(6 marks)*
Perform the indicated operations and simplify your answer.

$$\left(\frac{4x^2-9}{x^3-2x^2}\right) \div \left(\frac{2x^2+9x+9}{x^3+x^2-6x}\right)$$

Question 12. *(3 marks each = 30 marks)*
True of False. Indicate whether the given statements are true or false. In order to get full marks you much **justify each of your answers**.

a. The domain of $f(x) = 2^x$ is $(-\infty, \infty)$. True or False?

b. $64^{-\frac{1}{3}} = -4$. True or False?

c. The polar form of the complex number $-1 - j$ is $(\underline{\sqrt{2}}{45^\circ})$. True or False?

d. $\frac{\ln x}{\ln y} = \ln x - \ln y$. True or False?

e. $\csc x = \frac{1}{\sin x}$. True or False?

f. Long division of $2x^3 - 3x^2 + x - 4$ by $x - 3$ yields a remainder of 25. True or False?

g. The vertex of the parabola given by the equation $y = x^2 - 7x + 1$ is $(\frac{7}{2}, \frac{-45}{4})$

h. $j + j^2 + j^3 + j^4 + j^5 \ldots j^{62} + j^{63} = -1$. True or False?

Question 13. *(5 marks)*
Given the angle measurement $x = 0.85$ radians, find the values of the angles A, B and C in the following diagrams. Justify your answers. (Note that each diagram represents a circle sector)

[redacted]

Question 14. *(6 marks)*
The equation $x^3 + 8 = 0$ has one real solution and two complex solutions.
a. Convert -8 to its polar and exponential complex forms.
b. Find the three cube roots of -8 (the three solutions of the equation $x^3 + 8 = 0$) by using three exponential forms of -8. (Express your answers in rectangular form).
c. Find the three solutions of the equation by using both factoring and the quadratic formula.

Question 15. *(4 marks)*
Find the length x in the diagram below.

Question 16. *(4 marks)*

The sum of three electric currents that come together at a point in a circuit is zero. If the