Name (Print): _____ UW Student ID Number: _____

University of Waterloo
Term Test 1
Math 109
Mathematics for Accounting

Date: October 19, 2011

Time: 4:30 p.m. - 6:20 p.m.

Number of pages: 9
(including cover page)

Test type: Closed Book

Additional material allowed:
Non-programmable, non-graphing non-integrating calcluator.

Circle your section number

Instructor	Section	Lecture Time
Fiona Dunbar	001	(12:30 p.m. - 1:20 p.m.)
Paula Smith	002	(1:30 p.m. - 2:20 p.m.)

Instructions

1. Write your name and ID number at the top of this page. Please circle your section number up above.
2. Answer the questions in the spaces provided, using the backs of pages for overflow or rough work.
3. Show all your work required to obtain your answers.

FOR INSTRUCTOR'S USE ONLY			
Question	Mark	Question	Mark
1	/4	8	/5
2	/12	9	/6
3	/6	10	/10
4	/4	11	/10
5	/12	12	/4
6	/5	13	/7
7	/8	14	/7
Bonus	/2	Total	/100

1. Simplify the following: $\dfrac{6u^5 + 9u^3 - 1}{3u^2}$

2. Solve the equations for x

   (a) $\sqrt{x+3} + 1 = 3\sqrt{x}$

   (b) $5 - \dfrac{3(x+3)}{x^2+3x} = \dfrac{1-x}{x}$

   (c) $\dfrac{1}{x^4} - \dfrac{9}{x^2} + 8 = 0$

3. Solve the following inequality: $\left|\frac{2x-7}{4}\right| \geq 5$.

4. An apartment complex consists of 50 units. At \$400 per month, every unit can be rented. For each \$20 per month increase, there will be two vacancies. If the owner wants to receive a total of \$20,240 per month in rent, what rent should be charged for each unit?

5. Suppose $(a_k)_{k=1}^{\infty}$ is an infinite sequence defined by $a_1 = -2$, $a_{k+1} = -\frac{1}{2}a_k$.

   (a) Write out the first four terms of this sequence.

   (b) Find a formula for a_k, the kth term of the sequence in terms of k.

(c) Evaluate the sum of this sequence (a_k) or say why it does not exist.

6. Evaluate the sum $\sum_{k=7}^{200} 2k + 3$.

7. Is y a function of x? If so, is it a one-to-one function? If y is a one-to-one function of x, state y as a function of x and find the inverse function.

   (a) $3y - 2x + 4 = 0$

(b) $y - 3x^2 = 6$

(c) $x^2 + y^2 = 1$

8. If $f(x) = x^2 + 3x$, find $\dfrac{f(1+h) - f(1)}{h}$.

9. If $h(x) = \begin{cases} x - 1 & \text{if } x \geq 3 \\ 3 - x^2 & \text{if } x < 3 \end{cases}$ find $h(4)$ and $h(0)$ and $h(3)$.

10. Give the domain of the following functions in interval notation:

    (a) $f(x) = -\sqrt{4 - x^2}$

    (b) $g(x) = \dfrac{x+1}{x-3}$

11. Let $F(t) = t^2 + 7t + 1$ and $G(t) = \dfrac{2}{t-1}$.

    (a) Find $F(G(t))$ and indicate its domain in interval notation.

    (b) Find $G(F(t))$ and indicate its domain in interval notation.

12. Let $h(x) = \dfrac{2 - (3x - 5)}{(3x-5)^2 + 2}$. Find $f(x)$ and $g(x)$ such that $h(x) = f(g(x))$.

13. Sketch the graph of $y = -2(x-1)^2 + 3$ by starting with the graph of a standard function and applying transformations. State the x- and y-intercepts as an ordered pair, and indicate all the intercepts on the graph.

14. Sketch the surface $3x + 6y + 4z = 12$.

Bonus question: Let $C(x, y) = \sqrt{(x-3)(y-2)}$ be a cost function, where x is the number of widgets and y is the number of doojiggers manufactured. What is the domain of C, that is, what realistic values of (x, y) make $C(x, y)$ a real number?

This page is for rough work. It will not be graded.