Mathematics 135-002
Career Algebra
Fall, 2013

1. Instructor Information and Important Dates

Cathy Frost
E-mail: frost@camosun.bc.ca
Lansdowne Office: Ewing 250 Ph#:250-370-3404 **Website:** http://online.camosun.ca

Timetable:

Time	Monday	Tuesday	Wed	Thursday	Friday
10:30am - 12:30pm	Math 137 E346	Math 137 E346		Math 137 E346	Math 137 E346
12:30pm- 1:30pm	Office Hour	Office Hour		Office Hour	
5:00pm - 6:00pm		Office Hour		Office Hour	
6:00pm - 7:50pm		Math 135 E201		Math 135 E201	
Additional Office Hours by Appointment					

Important Dates:

Sep 3	First day of classes for Winter term
Sep 17	Fee Deadline
Oct 14	Thanksgiving Holiday- College closed
Nov 4	Withdrawal Deadline
Nov 11	Remembrance Day – College closed
Dec 7	Last day of classes for Winter term
Dec 9-14, 16, 17	Final Exam Period

2. Intended Learning Outcomes

(3 credits) This course may be used for entry into business programs, the criminal justice program, elementary education, and elementary statistics. It is also a good choice for students who want to refresh their skills before tackling a higher level mathematics course. Topics include a brief review of fractions, decimals, percentages and signed numbers; solving linear equations and inequalities in one variable; graphing linear equations and inequalities in two variables; function notation; systems of linear equations; integer and rational exponents; and fundamental polynomial operations. Camosun College calendar http://camosun.ca/learn/calendar/current/web/math.html

3. Exit Grade

A grade of C+ (65%) or better is needed for Business Programs at Interurban, Math 112, 113 or 109. A grade of C or better is needed for Math 116 or 137. Note that Math 135 cannot be used by BBA students to satisfy the UT math requirement although it can satisfy pre-requisites.

4. Required Materials

a) Career Algebra , Tobey, Slater, Blair, Crawford, 1st Custom Edition, Pearson, 2013.

b) The only calculator allowed on tests and the final exam is the Sharp EL-531 scientific calculator. Calculators will not be allowed on the first test.

5. Recommended Materials or Services to Assist Students to Succeed Throughout the Course

Math Labs: Ewing 342 & 224 (LANS) and Tec142 (INT)**:** These drop-in centres are available for you to work on math homework and to seek free help from the tutor on staff. See the hours posted on the math lab doors (most current) or go to http://camosun.ca/learn/programs/math/labs.html .
Study Tips: It is recommended that approximately 3-6 hours per week be spent studying for this course outside of class time. Find a study buddy to discuss math problems and use the math labs.

LEARNING SUPPORT AND SERVICES FOR STUDENTS

There are a variety of services available for students to assist them throughout their learning. This information is available in the College Calendar, Registrar's Office or the College web site at http://camosun.ca/

STUDENT CONDUCT POLICY

There is a Student Conduct Policy. It is the student's responsibility to become familiar with the content of this policy. The policy is available in each School Administration Office, Registration, and on the College web site in the Policy Section.
http://camosun.ca/about/policies/education-academic/e-2-student-services-&-support/e-2.5.pdf

ACADEMIC PROGRESS POLICY

The College has an academic progress policy geared mainly toward "at risk" students, the stated intention for which is to improve a student's likelihood of success. To view the policy, see the webpage http://camosun.ca/about/policies/education-academic/e-1-programming-&-instruction/e-1.1.pdf

6. Basis of Student Assessment and Grading

Assignments: There are 4 assignments. A handout will be provided at least a week before the due date. Full solutions are required. Assignments are due **by 8pm** on the designated day (see pacing schedule). Assignment keys will be posted on the website. Late assignments will NOT be accepted. There are no dropped assignments.

Tests: There are 4 tests. The dates and topics are on the pacing schedule. No calculators are allowed for Test 1. If you miss a test for any reason a zero will be assigned unless you make alternate arrangements with your instructor before the test. There are no dropped tests.

Quick Quizzes: To give you more practice between tests, I may give a quick quiz in any class. It will consist of one or two questions from the Recommended Homework. I'll count the best 10 quick quizzes so that you will not be penalized if you have to miss a class or two for illness or other reasons. As a result, there will be no make-up quick quizzes.

Grade Calculation: The final grade will be calculated according to the following breakdown:

Assignments and quick quizzes	20%
Tests:	30%
Comprehensive Final Exam (with no calculator section)	50%

Grade Scale:

0-49	50-59	60-64	65-69	70-72	73-76	77-79	80-84	85-89	90-100
F	**D**	**C**	**C+**	**B–**	**B**	**B+**	**A–**	**A**	**A+**

For information on Camosun College's grading policy, see the webpage http://camosun.ca/about/policies/education-academic/e-1-programming-&-instruction/e-1.5.pdf

7. Course Content and Schedule

Section		Recommended Exercise Questions (Answers in back of text)
	Review Chapter of Arithmetic Skills	
R.1	Simplify Fractions	11,17,19,33,41,45,47,57
R.2	Add And Subtract Fractions	3,15,19,25,37,43,53,55,73,75
R.3	Multiply And Divide Fractions	3,13,15,17,19,21,27,35,37,51,57
R.4	Decimals	5,17,23,31,35,45,51,53,75
R.5	Percent , Rounding & Estimating	5,9,15,17,27,33,35,41,43,51,61
R.6	Problem Solving	1,3,5,13,15
Test 1		
	Chapter 1 Real Numbers and Variables	
1.1	Adding Real Numbers	1,3,7,11,21,25,29,41,67,73
1.2	Subtracting Real Numbers	3,15,19,23,45,57,63
1.3	Multiply & Divide Real Numbers	3,15,19,27,35,39,47
1.4	Exponents	5,13,15,23,25,29,39,43
1.5	Order Of Operations	5,9,11,15,21,25,29
1.6	Distributive Property	7,9,15,17,21,23,25,31,41
1.7	Combining Like Terms	5,11,23,27,33,35,43
1.8	Substitution	7,13,17,25,33,39,43,47,55
1.9	Grouping	1,7,9,11,13,17,25
	Chapter 2 Equations and Inequalities	
2.1	Addition Principle	15,21,27,29,39,43
2.2	Multiplication Principle	3,5,9,17,31,39,45,49
2.3	Addition &Multiplication Principle Together	3,7,11,17,23,27,29,37,41,47
2.4	Equations With Fractions	1,3,9,11,15,17,21,25,31,33,41,43,45
2.5	Formulas	3,5,7,9,11,13,15,23,25,31,33,39,43
2.6	Inequalities and Compound Inequalities*	7,23,25,27,33,35,37,47,51,53,57,59, Handout
Test 2		
	Chapter 3 Solving Applied Problems	
3.1	Translating English To Algebraic Expressions	3,9,17,21,25,27,29
3.2	Word Problems	5,9,11,15,19,25,31
3.3	Word Problems Comparisons	1,5,9,11,15
3.4	Word Problems: Money & %	1,3,7,9,11,13,15,19,25
3.5	Word Problems: Geometry	7,9,13,15,23,29
3.6	Word Problems: Inequalities	3,5,7,15,17,21,23
	Chapter 4 Exponents and Variables	
4.1	Rules Of Exponents	5,7,11,17,19,23,25,31,39,41,49,53,61,65,69,73,77,81,83
4.2	Negative Exponents & Scientific Notation	1,3,5,7,9,11,13,15,17,19,25,29,35,37,39,43,47,49,61
	Rational Exponents*	Handout
4.3	Fundamental Polynomial Operations	5,7,11,13,19,21,27,31,33
4.4	Multiply Polynomials	1,3,5,7,9,25,29,33,37,41,45,49,51
4.5	Multiply Polynomials: Special Cases	3,5,9,13,17,23,31,37,41,43
4.6	Dividing Polynomials	1,5,9,11,17,19,23
Test 3		
	Chapter 5 Graphing & Functions	
5.1	Rectangular Coordinate System	5,9,19,21,23,25,29,35,39
5.2	Graphing Linear Equations	1,3,5,13,15,17,21,23,25,27,29,33
5.3	Slope	1,3,9,11,17,19,25,29,33,37,41,47,51,55
5.4	Write the Equation of a Line	1,3,9,11,21,23,27,31,33,37
5.5	Graph Inequalities	3,5,9,13,15,17
5.6	Functions	5,7,11,15,19,23,29,31,33,35,39,41
	Chapter 6 Systems of Equations	
6.1	Solving Equations With Two Variables; Graphing	1,3,7,11,19,21,25
6.2	Solving Equations With Two Variables: Substitution	1,5,9,11,29,35
6.3	Solving Equations With Two Variables: Elimination	5,13,15,27,33,39
6.4	Review of Methods	5,11,17,21,27
6.5	Word Problems	1,5,13,15,17,21
Test 4		

* Topic is not in the text but is covered in class and by a handout

Pacing Schedule (tentative)

Wk		Tuesday	Thursday
1	September	3 Intro, R.1,R.2	5 R.3,R.4
2		10 R.5,R.6 *Assignment #1 due*	12 **Test #1** (R.1-R.6, No calculator) 1.1-1.3
3		17 1.4,1.5,1.6 *Fee deadline*	19 1.7,1.8,1.9
4		24 2.1, 2.2,2.3	26 2.4, 2.5
5	October	1 2.6 , Compound Inequalities (handout)	3 3.1,3.2-3.6 *Assignment #2 due*
6		8 3.2-3.6 Review	10 **Test #2** (1.1-1.9, 2.1-2.6)
7		15 4.1, 4.2	17 Rational Exponents (handout)
8		22 4.3	24 4.4,4.5
9		29 4.6, 5.1	31 5.2, Review *Assignment #3 due*
10	November *Nov 4-Drop deadline*	5 5.3, Review	7 **Test #3** (3.1-3.6, 4.1-4.6)
11		12 5.4,5.5	14 5.6
12		19 6.1,6.2	21 6.3,6.4
13		26 6.5 *Assignment #4 due*	28 Review
14	December	3 **Test #4** (5.1-5.6, 6.1-6.5)	6 Exam Review
Final Exam Period: Dec 9-14, 16, 17			

2.6 Handout on Compound Inequalities

A compound inequality is the combination of two or more sets.

I Unions of Sets

The union of two sets A and B contains **all** the elements that are in Set A, Set B, or both. We write it as $A \cup B$. **We use the symbol $\cup$ or the word '*or*' to describe a union.**

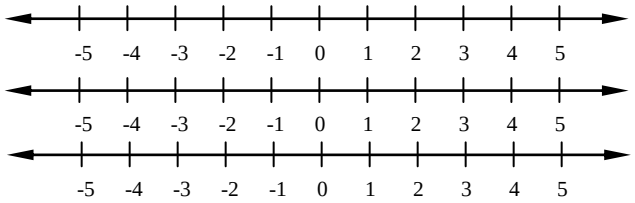
Eg. 1. Find $\{3,5,8,10\} \cup \{-2,0,3,10,14\}$

Eg. 2 Solve and Graph

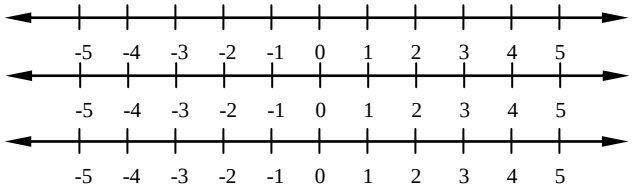
Steps for solving and graphing a compound inequality:

1. Solve each equation for *x*
2. Draw each inequality on its own number line
3. Draw the final most efficient way of representing the solution.

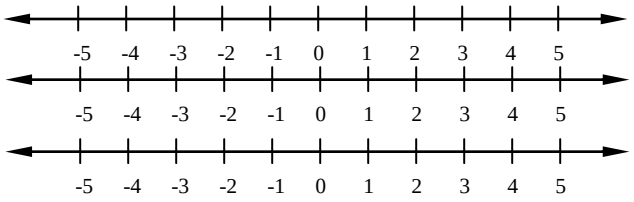
a) $x > -2 \quad or \quad x \leq 4$



b) $-x \geq 1 \quad or \quad x > 3$



c) $2x - 4 > 8 \quad or \quad 5 \leq -x + 3$

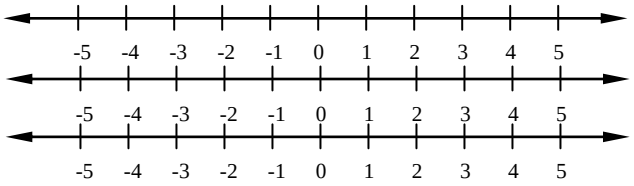


II Intersections of Sets

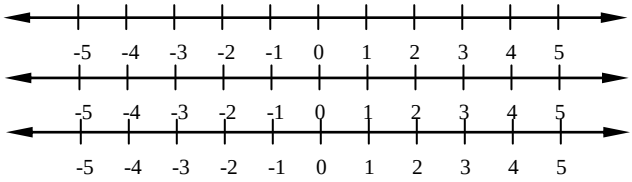
The intersection of two sets, A and B, is the set of all elements that are in **both** set A and set B. We write this as $A \cap B$. **We use the symbol $\cap$ or the word '*and*' to describe an intersection.**

1. Find $\{3,5,8,10\} \cap \{-2,0,3,10,14\}$
2. Solve and graph

a) $-3x < -6 \quad and \quad 2(x+1) \geq 0$



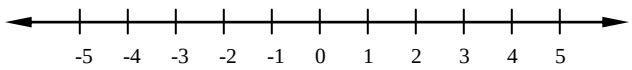
b) $\frac{1}{2}x - 1 > \frac{1}{3} \quad and \quad \frac{-x+5}{2} > 3$



Sometimes two sets have no elements in common. This is called the _____

III Sandwiches

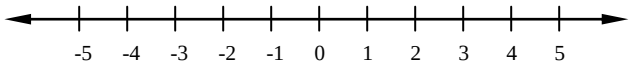
$-2 < x \le 3$ means



If we add the same quantity to all three sections do we change the solution?

$-2+1 < x+1 \le 3+1$

Solve and graph $5 < 9-2x \le 7$



IV Application

Brian uses a wetsuit for temperatures between $58°$ and $68°$ Fahrenheit. What is the range for the corresponding Celsius temperatures? The equation $F = 1.8C + 32$ can be used to convert Celsius temperatures C to Fahrenheit temperatures F.

Exercises

1. Find

a) $\{2,5,12,19,23\} \cup \{6,10,12,19\}$ b) $\{-7,0,3,8\} \cap \{-4,0,2,8,14\}$

2. Solve and graph on a number line. Draw the final most efficient way of representing the solution.

a) $x < -3$ *or* $x \ge 1$ b) $x \le -2$ *or* $x < 4$

c) $3x + 7 > 19$ *and* $7 - 2x \le 11$ d) $3(x-1) > 4(x-2)$ *or* $\frac{x+4}{3} \ge 2$

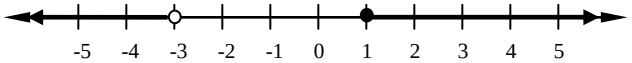
e) $-4 > x$ and $-3x \le 6$ f) $-9 \le 2x - 5 \le 5$

3. For an aerobic workout, a 20 year old woman wants to keep her heart rate between 150 and 170 beats per minute. If she checks her pulse for a 10 second interval, how many beats should it fall between? Express as an inequality.

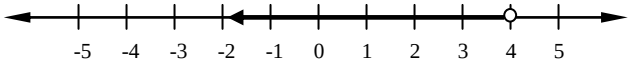
Answers

1a) $\{2,5,6,10,12,19,23\}$ b) $\{0,8\}$

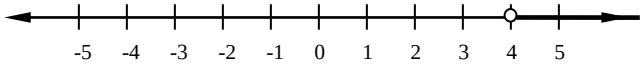
2 a) $x \le -2$ *or* $x < 4$



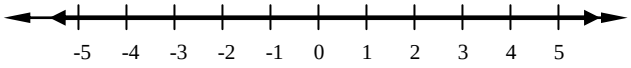
b) $x < 4$



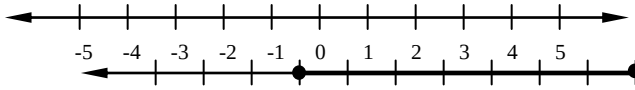
c) $x > 4$



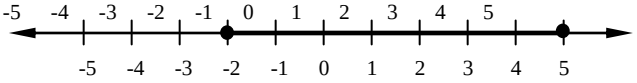
d) All real numbers



e) { }



f) $-2 \le x \le 5$



Rational (Fractional) Exponents Handout

Section 1 – Understanding and defining $a^{1/2}$

When we assign meaning to the expression, $a^{1/2}$, our guiding principle will be to make sure that our interpretation is consistent with the known rules of exponents. For example: $9^2 \cdot 9^3 = (9 \cdot 9) \cdot (9 \cdot 9 \cdot 9) = 9^5$ This is the sum rule for exponents, that is: $9^2 \cdot 9^3 = 9^{2+3} = 9^5$ If we want to give meaning to $9^{1/2}$,then by the sum rule for exponents we have $9^{1/2} \cdot 9^{1/2} = 9^{1/2+1/2} = 9^1 = 9$ Therefore, $9^{1/2}$ is the number that if you multiply it by itself gives 9. So it makes sense to define $9^{1/2} = 3$ since $3 \cdot 3 = 9$. We already know that $\sqrt{9} = 3$, so it also makes sense that: $9^{1/2} = \sqrt{9}$. We know that the square root of a negative number is not a real number (no number multiplied by itself can give a negative answer), so $a^{1/2}$ will not be a real number if a is negative. Therefore for all positive real numbers a, we have: $a^{1/2} = \sqrt{a}$

Examples: Evaluate the following if possible: a) $49^{1/2}$ b) $(-25)^{1/2}$

a) $49^{1/2}$ is the number that if you multiply it by itself gives 49.Since $7 \cdot 7 = 49$, we have $49^{1/2} = 7$ **or** $49^{1/2} = \sqrt{49} = 7$

b) There is no real number that you can multiply by itself to give -25, so $(-25)^{1/2}$ is not a real number.

Exercises: Evaluate the following if possible.

1. $36^{1/2}$ 2. $100^{1/2}$ 3. $\left(\frac{1}{16}\right)^{1/2}$ 4. $(-9)^{1/2}$ 5. $\left(\frac{64}{25}\right)^{1/2}$

Section 2 – Understanding and defining $a^{1/3}$

Using the same reasoning that we applied in Section 1, we have: $8^{1/3} \cdot 8^{1/3} \cdot 8^{1/3} = 8^{1/3+1/3+1/3} = 8^1 = 8$. That is, $8^{1/3}$ is the number that you multiply 3 times to give 8. We know that: $2 \cdot 2 \cdot 2 = 8$. Therefore $8^{1/3} = 2$ We also know that the cube root of 8 is 2, that is $\sqrt[3]{8} = 2$, so $8^{1/3} = \sqrt[3]{8}$. Unlike square roots, it is possible to take the cube root of a negative number, so $\sqrt[3]{-64} = -4$ since $(-4) \cdot (-4) \cdot (-4) = -64$. So, $(-64)^{1/3} = -4$. Therefore for all real numbers a, we have: $a^{1/3} = \sqrt[3]{a}$

Examples: Evaluate the following if possible: a) $125^{1/3}$ b) $(-216)^{1/3}$

a) $125^{1/3}$ is the number you multiply 3 times to give 125. Since $5 \cdot 5 \cdot 5 = 125$, we have $125^{1/3} = 5$ **or** $125^{1/3} = \sqrt[3]{125} = 5$

b) $(-216)^{1/3}$ is the number you multiply 3 times to give -216. Since $(-6)(-6)(-6) = -216$, we have $(-216)^{1/3} = -6$ **or** $(-216)^{1/3} = \sqrt[3]{(-216)} = -6$

Exercises: Evaluate the following if possible:

6. $27^{1/3}$ 7. $(1000)^{1/3}$ 8. $(-8)^{1/3}$ 9. $\left(\frac{1}{64}\right)^{1/3}$ 10. $\left(\frac{8}{27}\right)^{1/3}$

Section 3 – Understanding and defining $a^{1/n}$

Taking the same approach as above, it seems obvious that $625^{1/4}$ should be the number that when multiplied four times gives 625. Since $5 \cdot 5 \cdot 5 \cdot 5 = 625$ we must have: $625^{1/4} = \sqrt{625} = 5$. In general, for a real number *a* we define: $a^{1/n} = \sqrt[n]{a}$ The only exception to this is when *a* is negative and n is even. In this case $a^{1/n}$ is undefined (not a real number). For example: $(-16)^{1/4} = \sqrt[4]{-16}$ is undefined, since there is no real number that multiplies itself 4 times to give an answer of -16. However, if n is odd we get $(-32)^{1/5} = \sqrt[5]{(-32)} = -2$, since -2 multiplied by itself 5 times gives -32.

Examples: Evaluate the following if possible: a) $64^{1/6}$ b) $(-243)^{1/5}$ c) $(-48)^{1/4}$

a) $64^{1/6}$ is the number that when multiplied by itself six times gives 64. So $64^{1/6} = \sqrt[6]{64} = 2$

b) $(-243)^{1/5}$ is the number that when multiplied by itself 5 times gives -243. So $(-243)^{1/5} = \sqrt[5]{-243} = -3$

c) There is no real number that when multiplied by itself four times would give a negative answer. So, $(-48)^{1/4}$ is not a real number.

Exercises: Evaluate the following if possible:

11. $81^{1/4}$ 12. $32^{1/5}$ 13. $(-10000000)^{1/7}$ 14. $\left(\frac{625}{16}\right)^{1/4}$ 15. $(-256)^{1/8}$

Section 4 – Understanding and defining $a^{m/n}$

Now that we know how to evaluate $a^{1/n}$ we will continue to use rules of exponents to determine how to interpret $a^{m/n}$. Remember the power rule of exponents that gives: $(9^2)^4 = 9^{2\cdot 4} = 9^8$ If we want to calculate $9^{3/2}$ this same rule of exponents would give: $(9^{1/2})^3 = 9^{1/2\cdot 3} = 9^{3/2}$ or $(9^3)^{1/2} = 9^{3\cdot 1/2} = 9^{3/2}$ .So, we have two ways to evaluate $9^{3/2}$, either:

$9^{3/2} = (9^{1/2})^3 = (\sqrt{9})^3 = (3)^3 = 27$ or $9^{3/2} = (9^3)^{1/2} = (729)^{1/2} = \sqrt{729} = 27$

Note that although both interpretations are valid, the first is often simpler when working numerical answers without a calculator. So in general for a real number *a* we have: $a^{m/n} = (a^{1/n})^m = (\sqrt[n]{a})^m$ or $a^{m/n} = (a^m)^{1/n} = \sqrt[n]{a^m}$

As before if *a* is negative and *n* is even $a^{m/n}$ will not be a real number.

Examples: Evaluate the following if possible: a) $16^{3/4}$ b) $125^{4/3}$ c) $(-49)^{5/2}$

a) $16^{3/4} = (\sqrt[4]{16})^3 = 2^3 = 8$ b) $125^{4/3} = (\sqrt[3]{125})^4 = 5^4 = 625$

c) $(-49)^{5/2}$ is not a real number

Exercises: Evaluate the following if possible, use your calculator for Question 21.

16. $8^{5/3}$ 17. $81^{5/4}$ 18. $(-100000)^{2/5}$ 19. $\left(\frac{16}{9}\right)^{3/2}$ 20. $(-25)^{5/6}$ 21. $(-9)^{5/3}$

Section 5 – Negative Rational Exponents $a^{-m/n}$

Lastly, we want to recall how to interpret negative exponents. In keeping with the rules of exponents, we have

$9^{-2} \cdot 9^2 = 9^{-2+2} = 9^0 = 1$ therefore $9^{-2} = \frac{1}{9^2} = \frac{1}{81}$

This holds true for rational exponents as well, so we would have: $27^{-5/3} = \frac{1}{27^{5/3}} = \frac{1}{(\sqrt[3]{27})^5} = \frac{1}{3^5} = \frac{1}{243}$

Exercises: Evaluate the following if possible:

22. $36^{-3/2}$ 23. $64^{-2/3}$ 24. $(-8)^{-4/3}$ 25. $(-4)^{-7/4}$ 26. $(\frac{16}{81})^{-3/4}$

Answers:

1. 6 2. 10 3. $\frac{1}{2}$ 4. not real 5. $\frac{8}{5}$ 6. 3

7. 10 8. -2 9. $\frac{1}{4}$ 10. $\frac{2}{3}$ 11. 3 12. 2

13. –10 14. $\frac{5}{2}$ 15. not real 16. 32 17. 243 18. 100

19. $\frac{64}{27}$ 20. not real 21. –38.94 22. $\frac{1}{216}$ 23. $\frac{1}{16}$ 24. $\frac{1}{16}$

25. not real 26. $\frac{27}{8}$