

The final exam for MTH 100 will be a comprehensive multiple choice exam. This study guide is intended to help students review the objectives that are covered in the course. A scientific calculator is allowed, but not a graphing calculator.



Objective 1A Set: *Solve linear equations.* (Two problems similar to problems in this set will be chosen for the final exam.)

Solve the equation and determine if it is conditional, an identity, or a contradiction. If the equation is conditional give the solution.	Answers
1. $4(2 - 7t) + 14t = -14t + 12$	contradiction
2. $9(9 - a) = 93 - 6a$	$a = -4$
3. $\frac{3(t-13)}{2} = t - 12$	$t = 15$
4. $19.2x - 4(x + 0.8) = -48.8$	$x = -3$
5. $x + 7 = \frac{5x + 15}{5} + 4$	identity
6. $\frac{4(2x - 4)}{3} = \frac{2}{5}(x - 1)$	$\frac{37}{17}$

Objective 1B Set: *Solve absolute value equations.* (One problem similar to problems in this set will be chosen for the final exam.)

Solve the equation, if possible.	Answers
1. $ x + 5 = 8$	-13, 3
2. $ x - 25 = -10$	no solution
3. $\left \frac{3}{4}x - 4 \right - 7 = -5$	$8, \frac{8}{3}$

Objective 2A Set : *Solving Compound Inequalities* (One problem similar to problems in this set will be chosen for the final exam.)

Solve the inequality and graph the solution set.	Answers
1. $-6 < -3(x - 4) \leq 24$	
2. $34 > 3x - 2 > 10$	

3. $-5 \leq \frac{11-3x}{2} \leq 5$	
4. Solve the inequality and graph the solution set. $-10 \leq -2(x-4) < 24$	

Objective 2B Set: Solving Inequalities (One problem similar to problems in this set will be chosen for the final exam.)

Solve the inequality. Give the result in interval notation.	Answers
1. $21 - 6x \leq x$	$[3, \infty)$
2. $-6(y-1) < y+12$	$\left(-\frac{6}{7}, \infty\right)$
3. $-3(a+1) > 2(a+4)$	$\left(-\infty, -\frac{11}{5}\right)$
4. $3x - 1 < 5$	$(-\infty, 2)$

Objective 2C Set: Solving Inequalities with Absolute Value (One problem similar to problems in this set will be chosen for the final exam.)

Solve the inequality.	Answers
1. $ x-6 \leq 13$	$[-7, 19]$
2. $ 5x + 9 \leq -9$	no solution
3. $ 5-3x \geq 11$	$(-\infty, -2] \cup \left[\frac{16}{3}, \infty\right)$
4. $ 1-2x < 3$	$(-1, 2)$
5. $ x-19 > 38$	$(-\infty, -19) \cup (57, \infty)$
6. $ x+6 \geq 18$	$(-\infty, -24] \cup [12, \infty)$

Objective 3A Set: Solving Literal Equations (One problem similar to problems in this set will be chosen for the final exam.)

	Answers
1. Solve the formula for the indicated variable. $p = 2c + 2h$ for c	$c = \frac{p-2h}{2}$
2. Solve the formula for the indicated variable. $A = \frac{1}{2}qy$ for q	$q = \frac{2A}{y}$
3. Solve the formula for the indicated variable. $P = L + \frac{g}{f}i$ for f	$f = \frac{gi}{P-L}$

4. Solve the formula $a = \frac{1}{2}(F + p)y$ for the variable y .	$y = \frac{2a}{F + p}$
5. Solve the formula $Q = \frac{1}{3}\pi b^2 w$ for the variable w .	$w = \frac{3Q}{\pi b^2}$
6. Solve the formula $S(1 - r) = a - kr$ for the variable r .	$r = \frac{S - a}{S - k}$

Objective 3B Set: Solving Mixture and Motion Applied Problems (One problem similar to problems in this set will be chosen for the final exam.)

- Granville and Preston are 435 miles apart. A car leaves Preston bound for Granville at 44 mph. At the same time, another car leaves Granville bound for Preston at 43 mph. How long will it take them to meet?
- A plane leaves an airport and flies south at 184 mph. Later, a second plane leaves the same airport and flies south at 460 mph. If the second plane overtakes the first one in $1\frac{1}{2}$ hours, how long of a head start did the first plane have?
- Two trains are 276 miles apart, and their speeds differ by 10 mph. They are traveling toward each other and will meet in 3 hours. Find the speed of the slower train.
- A nurse wishes to add water to 30 ounces of a 10% solution of benzalkonium chloride to dilute it to a 4% solution. How much water must she add?

Answers

1) 5 hrs. 2) $2\frac{1}{4}$ hrs. 3) 41mph 4) 45 oz.

Objective 3C Set: Solving Money and Investments Applied Problems (One problem similar to problems in this set will be chosen for the final exam.)

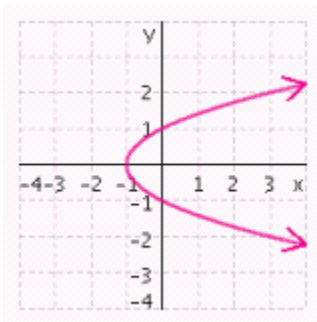
- A broker has invested \$22,000 in two mutual funds, one earning 9% annual interest and the other earning 14%. After 1 year, his combined interest is \$2,855. How much was invested at each rate?
- When equal amounts are invested in each of three accounts paying 7%, 8% and 10.5% interest, one year's combined interest income is \$1,109.25. How much is invested in each account?

Answers

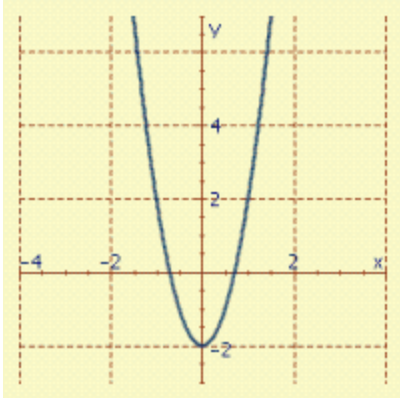
1) \$4,500 at 9%, \$17,500 at 14% 2) \$4,350

Objective 4A-Determine whether relation is a function (One problem similar to these will be chosen for the final exam.)

- The graph represents a correspondence between x and y . Determine whether the correspondence is a function. If it is, give its domain and range.



2. The graph represents a correspondence between x and y . Tell whether the correspondence is a function.



Answers 1) not a function 2) yes

Objective 4B - Evaluate functions (One problem similar to the following will be used on the final exam):

1. Find $g(w)$ and $g(w + 1)$

$$g(x) = 4x - 7$$

2. Find the value given that $f(x) = 6x + 8$.

$$f(b) - f(1)$$

3. A mortar shell is s feet above the ground after t seconds, where $s = f(t) = -16t^2 + 509t + 58$. Find the height of the shell 15 seconds after it is fired.

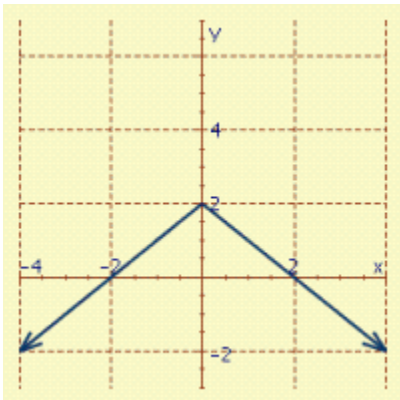
Answers: 1) $g(w) = 4w - 7$; $g(w + 1) = 4w - 3$ 2) $6b - 6$ 3) $s = 4,093$ ft

Objective 4C: Domain and Range (One problem similar to the problems in this set will be chosen for the final exam.)

1. Find the domain of the function.

$$\{(0, 5), (1, 4), (2, 2)\}$$

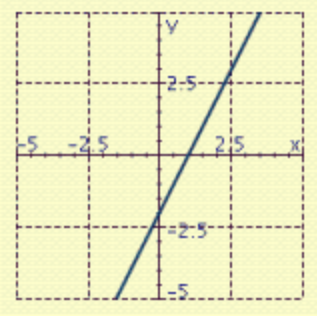
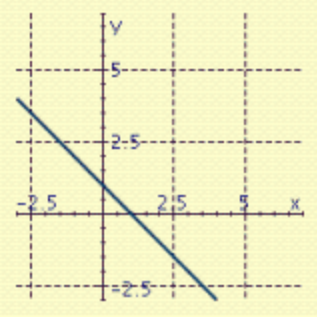
2. Find the domain and range of the function.



Answers:

1. $D = \{ 0, 1, 2 \}$
2. $D = (-\infty, \infty)$ and $R = (-\infty, 2]$

Objective 5A Set - Graph Linear Equations (One problem similar to the problems in this set will be chosen for the final exam.)

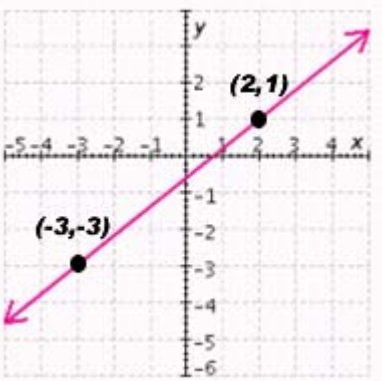
Graph the equation.	Answers
1. $4y = 8x - 8$	
2. $x + y = 1$	

Objective 5B Set – Writing Linear Equations in specified form (One problem similar to the problems in this set will be chosen for the final exam.)

	Answers
1. Use slope-intercept form to write the equation of the line with the given properties. Write the answer in slope-intercept form. $m = -7$, $b = 6$	$y = -7x + 6$
2. Write the equation in slope-intercept form to find the slope and the y-intercept. $2(2x - 3y) = 1$	$\frac{2}{3}, (0, -\frac{1}{6})$
3. Write an equation in general form for a line with the following properties: $m = 7$, $P(0, 8)$	$7x - y = -8$

Objective 5C Set - Using Point-Slope Form to write the equation of a line (One problem similar to the problems in this set will be chosen for the final exam.)

	Answers
1. Use point-slope form to write the equation of the line passing through the two given points. Write the equation in slope-intercept form.	

$P(3,0), Q(5,-8),$	$y = -4x + 12$
2. Use point-slope form to write the equation of the line. Write the answer in slope-intercept form.	$y = \frac{4}{5}x - \frac{3}{5}$
	
3. Write the equation of the line that passes through the given point and is parallel to the given line. Write the answer in slope-intercept form. $P(-6,7), y + 4x = -19,$	$y = -4x - 17$
4. Write the equation of the line that passes through the given point and is perpendicular to the given line. Write the answer in slope-intercept form. $P(-6,4), y + 3x = -15$	$y = \frac{1}{3}x + 6$
6. Write an equation in general form for a line with the following properties: $m = 7, P(-5,0)$	$7x - y = -35$

Objective 6 Set: Solving Systems of Linear Equations (Three problems similar to problems in this set will be chosen for the final exam.)

Solve the system, if possible. If the system has no solution or an infinite solution set, describe the system.	Answers
1. $\begin{cases} \frac{5}{2}x + 3y = 9 \\ y = \frac{36 - 10x}{12} \end{cases}$	Dependent system
2. $\begin{cases} y = x + 2 \\ x + 2y = 10 \end{cases}$	$(2, 4)$
3. $\begin{cases} 2x - 2y = -9 \\ 3x + 4y = -10 \end{cases}$	$(-4, \frac{1}{2})$
4. $\begin{cases} x - y = 4 \\ x + y = 10 \end{cases}$	$(7, 3)$

5.	$\begin{cases} 8x + 15y = 14 \\ 2x - 12y = -7 \end{cases}$	$(\frac{1}{2}, \frac{2}{3})$
6.	$\begin{cases} x = \frac{3}{2}y + 10 \\ 2x - 3y = 2 \end{cases}$	no solution

Objective 7A Set- Adding and Subtracting Rational Expressions (One problem similar to the problems in this set will be chosen for the final exam.)

	Perform the operation. Simplify the answer, if possible.	Answers
1.	$\frac{x+5}{xy} - \frac{x-1}{x^2y}$	$\frac{x^2 + 4x + 1}{x^2y}$
2.	$\frac{y+5}{y-6} - \frac{y+3}{6-y}$	$\frac{2y+8}{y-6}$
3.	$\frac{a}{a-4} - \frac{7}{a+6} + \frac{a-6}{a^2+2a-24}$	$\frac{a^2+22}{a^2+2a-24}$
4.	$\frac{x+1}{3x+6} - \frac{x^2}{3x^2-12}$	$-\frac{1}{3(x-2)}$
5.	$\frac{z}{z-6} + \frac{36+6z}{z^2-36}$	$\frac{z+6}{z-6}$

Objective 7B Set - Multiplying and Dividing Rational Expressions (One problem similar to the problems in this set will be chosen for the final exam.)

	Answers
1. Perform the multiplication. Simplify the answer, if possible. $\frac{7z-14}{z+2} \cdot \frac{2}{2z-4}$	$\frac{7}{z+2}$
2. Perform the multiplication. Simplify the answer, if possible. $\frac{s^2+5s-6}{4s-4} \cdot \frac{4s}{s+6}$	s
3. Perform the division. Simplify the answer, if possible. $\frac{3y+y^2}{y^3-5y^2} \div \frac{y^2+3y}{(y-5)^2}$	$\frac{y-5}{y^2}$
4. Perform the division. Simplify the answer, if possible. $\frac{t^2+2t-48}{9t-54} \div \frac{t^2+16t+64}{t+8}$	$\frac{1}{9}$

5. Perform the division. Simplify your answer, if possible. $\frac{ab+4a+2b+8}{b^2+4b+16} \div \frac{b^2-16}{b^3-64}$	$a+2$
--	-------

Objective 7C Set - Complex Fractions and Solving Rational Expressions (One problem similar to the problems in this set will be chosen for the final exam.)

	Answers:
1. Simplify the complex fraction. $\frac{\frac{1}{y}+2}{\frac{4}{y}-3}$	1. $\frac{1+2y}{4-3y}$
2. Simplify the complex fraction. $\frac{1}{\frac{1}{x}+\frac{1}{y}}$	2. $\frac{xy}{y+x}$
3. Simplify the complex fraction. $\frac{\frac{2}{x-2}}{\frac{2}{x-2}-1}$	3. $\frac{2}{4-x}$
4. Solve the equation and check the solution. $\frac{a^2}{a+1} - \frac{1}{a+1} = a$	4. no solution, -1 is extraneous
5. Solve the equation and check the solution. $\frac{17}{q^2+15q+54} + \frac{1}{q+9} = \frac{2}{q+6}$	5. 5
6. Solve the equation and check the solution. $y + \frac{2}{3} = \frac{2y-37}{3y-24}$	6. 1, 7

Objective 8A - Product Rule with Rational Exponents (One problem similar to the problems in this set will be chosen for the final exam.)

Perform the operation. Do not use negative exponents in the answer. Assume that all variables represent positive numbers.	Answers
1. $b^{\frac{2}{7}}b^{\frac{4}{7}}$	1. $b^{\frac{6}{7}}$
2. $x^{-\frac{3}{4}}x^{\frac{4}{5}}$	2. $x^{\frac{1}{20}}$
3. $m^{\frac{2}{3}}m$	3. $m^{\frac{5}{3}}$

Objective 8B - Quotient Rule with Rational Exponents (One problem similar to the problems in this set will be chosen for the final exam.)

Perform the operation. Do not use negative exponents in the answer. Assume that all variables represent positive numbers.	Answers
1. $\frac{a^{\frac{1}{2}}}{a^{\frac{1}{3}}}$	1. $a^{\frac{1}{6}}$
2. $\frac{10x^{\frac{2}{3}}}{8x^{\frac{1}{3}}}$	2. $\frac{5x^{\frac{1}{3}}}{4}$

Objective 8C Set - Power Rule with Combination of Rational Exponent Rules (One problem similar to this problem set will be chosen for the final exam.)

1. Simplify: $\left(\frac{2^{-2}w^{-\frac{3}{4}}x^{-\frac{5}{8}}}{w^{\frac{3}{4}}x^{-\frac{1}{2}}}\right)^{-3}$ Answer: $64w^{\frac{9}{2}}x^{\frac{3}{8}}$

Objective 9A Set - Adding and Subtracting Radical Expressions (One problem similar to the problems in this set will be chosen for the final exam.)

Simplify and combine like radicals. All variables represent positive numbers.	Answers
1. $\sqrt{200} - \sqrt{128}$	1. $2\sqrt{2}$
2. $\sqrt[3]{24} - \sqrt[3]{192}$	2. $-2\sqrt[3]{3}$
3. $\sqrt{9yz^2} + \sqrt{64yz^2}$	3. $11z\sqrt{y}$
4. $2\sqrt[3]{54} - \sqrt[3]{16} - 3\sqrt[3]{128}$	4. $-8\sqrt[3]{2}$

Objective 9B - Multiplying and Dividing Radical Expressions and Rationalizing Denominators (One problem similar to the problems in this set will be chosen for the final exam.)

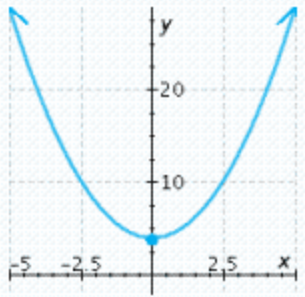
	Answers
1. Perform the multiplication and simplify, if possible. $7\sqrt{3}(4\sqrt{5} + 2\sqrt{7})$	1. $28\sqrt{15} + 14\sqrt{21}$
2. Perform the multiplication and simplify, if possible. The variables represent positive numbers. $(4\sqrt{p} - \sqrt{5q})(\sqrt{p} + 3\sqrt{5q})$	2. $4p + 11\sqrt{5pq} - 15q$
3. Rationalize the denominator. $\frac{7}{\sqrt{7}-1}$	3. $\frac{7(\sqrt{7}+1)}{6}$

4. Rationalize the denominator. The variable represents a positive number. $\frac{8x}{\sqrt{x+3}}$	4. $\frac{8x(\sqrt{x-3})}{x-9}$
---	---------------------------------

Objective 9C - Solving Equations with Radical Expressions (One problem similar to the problems in this set will be chosen for the final exam.)

Solve the equation. Write all solutions and then indicate which of those solutions are extraneous.	Answers
1. $\sqrt[3]{7n-8} = 3$	1. $n = 5$
2. $\sqrt{x+2} = \sqrt{16-x}$	2. $x = 7$
3. $\sqrt{-x+5} = x-5$	3. $x = 5, x = 4$ is extraneous

Objective 10A - Graphing Quadratic Equations and Using the Root Property to Solve Quadratic Eqs (One problem similar to the problems in this set will be chosen for the final exam.)

	Answers
1. Graph the function. $f(x) = x^2 + 4$	
2. Use the square root property to solve the equation. $(s-7)^2 - 4 = 0$	2. $s = 5, 9$

Objective 10B Set - Solving Quadratic Equations by Quadratic Formula

(Two problems similar to the problems in this set will be chosen for the final exam.)

Use the quadratic formula to solve the equation.	Answers
1. $16y^2 + 8y - 3 = 0$	1. $y = \frac{1}{4}, -\frac{3}{4}$
2. $2w^2 + 6w + 1 = 0$	2. $w = \frac{-3 \pm \sqrt{7}}{2}$
3. $5z^2 + 2z = -5$	3. $z = -\frac{1}{5} \pm \frac{2\sqrt{6}}{5}i$