

### Answers to Study Guide for Midterm Three

Below are some problems and instructions that are representative of the types you will see on the test. See your textbook and homework for additional problems.

In general, **do not use mixed numbers**. Instead, **use improper fractions** from here on out.

**1. Factor.** If the polynomial is prime, say so. Show all work for full credit. Circle your final answers.

a) $x^2 - 11x + 18$ $(x-2)(x-9)$	b) $2x^2 + 20x + 42$ $2(x+3)(x+7)$
c) $25x^2 - 16$ $(5x-4)(5x+4)$	d) $x^2 - 4xy - 21y^2$ $(x-7y)(x+3y)$
e) $5x^5 + 45x^4 + 70x^3$ $5x^3(x+2)(x+7)$	f) $3xy^2 - 48x$ $3x(y-4)(y+4)$
g) $-x^2 - 4x - 3$ $-(x+3)(x+1)$ <i>Factor out the -1 first!</i>	h) $3x^3 + x^2 + 27x + 9$ $(3x+1)(x^2+9)$

**2. Perform the indicated operations & simplify your answers.** Note:  $3x^2 + 16$  is prime. Circle your final answers.

a) $(4p + 8q) + (4p - 9q)$ $8p - q$	b) $(3t - 5w)^2$ $9t^2 - 30tw + 25w^2$
c) $(2x - 5)(3x^2 + 4x - 2)$ $6x^3 - 7x^2 - 24x + 10$	d) $-5xy(3x^2 - 7xy + 9y^2)$ $-15x^3y + 35x^2y^2 - 45xy^3$
e) $2(x + 3)^2 - 4$ $2x^2 + 12x + 14$	f) $5p^3t(-6p^3t)$ $-30p^6t^2$
g) $(11x - 7) - (5x + 8)$ $6x - 15$	h) $(5x - 4y)(3x - 6y)$ $15x^2 - 42xy + 24y^2$

In this context, "simplified" means positive exponents only and each variable should only appear once.

**3. Simplify.** Use integers or simplified fractions only in your answers. Circle your final answers.

a) $\frac{48x^6y^4}{8x^5y^{-3}}$ $6xy^7$	b) $\frac{4^{-8}}{4^{-6}}$ $\frac{1}{16}$	c) $(4x^{-2}y)^3$ $\frac{64y^3}{x^6}$
d) $-5c^4(c^2)^5$ $-5c^{14}$	e) $7^{-2}$ $\frac{1}{49}$	f) $\frac{(2a^{-6}b)^{-3}}{(3cd^{-2})^2}$ $\frac{a^{18}d^4}{72b^3c^2}$

**4. Solve the system by substitution.**

$$\begin{aligned} 6x - 5y &= -8 \\ x + 3y &= 14 \end{aligned}$$

Make sure you use the specified method for credit!

a) Circle the correct description of the system. <ul style="list-style-type: none"> <li>i. Dependent system</li> <li><input checked="" type="radio"/> ii. One solution system</li> <li>iii. Inconsistent system.</li> </ul>
b) What is the solution of the system of the system of equations? Circle the correct choice below, and if necessary, fill in the answer box to complete your choice. <ul style="list-style-type: none"> <li>i. <u>(2,4)</u> (Write the ordered pair.)</li> <li>ii. There are infinitely many solutions.</li> <li>iii. There is no solution.</li> </ul>

5. Solve the system by elimination.

$$\begin{aligned} 6x - 9y &= -3 \\ -10x + 15y &= 5 \end{aligned}$$

*← should have been a 5*

a) Circle the correct description of the system.

- i. Dependent system
- ii. One solution system
- iii. Inconsistent system.

b) What is the solution of the system of the system of equations? Circle the correct choice below, and if necessary, fill in the answer box to complete your choice.

- i. \_\_\_\_\_ (Write the ordered pair.)
- ii. There are infinitely many solutions.
- iii. There is no solution.

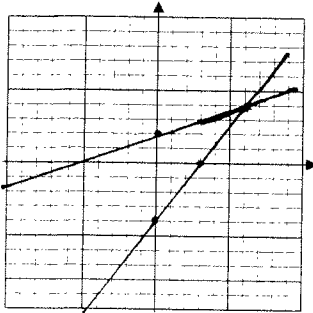
6. Find the solution of the system by graphing the equations by hand.

$$\begin{aligned} y &= \frac{1}{3}x + 2 \\ y &= \frac{4}{3}x - 4 \end{aligned}$$

$$\begin{cases} x - 3y = -6 \\ 4x - 3y = 12 \end{cases}$$

*write in slope-int form  
y = mx + b so you can graph*

a) Graph the system.



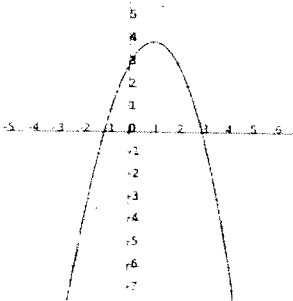
b) Circle the correct description of the system.

- i. Dependent system
- ii. One solution system
- iii. Inconsistent system.

c) What is the solution of the system of the system of equations? Circle the correct choice below, and if necessary, fill in the answer box to complete your choice.

- i. (6, 4) (Write the ordered pair.)
- ii. There are infinitely many solutions.
- iii. There is no solution.

7. Use the graph below to answer the questions that follow.



a) Find  $f(3)$ . *0*

b) Find  $x$  when  $y = -4$ .

*-2 and 4*

c) Find the  $y$ -intercept(s).

*(0, 3)*

d) Find the  $x$ -intercept(s).

*(-1, 0) and (3, 0)*

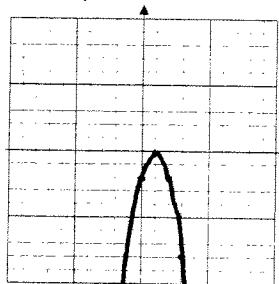
e) Find the vertex.

*(1, 4)*

8. Graph the equation by hand. To begin, substitute the values of -3, -2, -1, 0, 1, 2, and 3 for  $x$ . Make other substitutions as necessary. Then use a graphing calculator to verify your work.

$$y = -2x^2 + 4x - 2$$

b) Graph



*graph of a quadratic equation is a parabola*

a) Complete the table below

$x$	$y$
-3	-32
-2	-18
-1	-8
0	-2
1	0
2	-2
3	-8

9. Ad-supported cable television has gained ground steadily on broadcast television (see the table). Use this data to answer parts (a) – (c).

Year	Prime-Time Household Viewing Shares (percent)							
	1988	1990	1992	1994	1996	1998	2000	2003
Broadcast	80.2	76.1	73.8	72.2	66.7	59.4	56.1	48.1
Ad-supported cable	10.6	14.9	17.8	19.7	25.0	31.0	34.0	41.4

a) Let  $s$  be the prime-time household viewing share for all broadcast TV stations at  $t$  years since 1980. Find an equation of a model to describe the data. Circle the correct answer.

- i.  $s = 4.18t + 98.99$       ii.  $s = -4.18t + 98.99$       iii.  $s = 2.14t + 98.99$       iv.  $s = -2.14t + 98.99$

b) Let  $s$  be the prime-time household viewing share for all ad-supported cable TV stations at  $t$  years since 1980. Find an equation of a model to describe the data. Circle the correct answer below.

- i.  $s = 2.04t - 6.56$       ii.  $s = -2.04t - 6.56$       iii.  $s = 4.18 - 6.56$       iv.  $s = -4.18 - 6.56$

c) Use substitution or elimination to estimate when the prime-time household viewing shares for all broadcast stations and all ad-supported cable stations were equal. What is that viewing share? Use the answers from parts (a) and (b) to find these answers.

Remember to show all work and answer the questions in a complete sentence for full credit. Round your intermediate answers to two decimal places and final answers to the nearest year or two decimal places, as appropriate.

Make sure to show your work using either substitution or elimination. Then answer both questions.

Actual solution to the system is (25.25, 44.95)

In 2005, the prime-time household viewing shares for all broadcast stations and all ad-supported cable stations were equal. That viewing share was 44.95%.