

SHOW ALL WORK ON THIS TEST OR ON SEPARATE PAPER. Circle answers.
TURN IN ALL WORKSHEETS. CALCULATORS ARE REQUIRED ON THIS TEST.

1. Solve the systems of equations. (Explain or show what you did.)

a)
$$\begin{aligned} -3x + 7y &= 4 \\ 2x - 3y &= -6 \end{aligned}$$

b)
$$\begin{aligned} 12y + 5x &= 41 \\ x &= 4 - 3y \end{aligned}$$

c)
$$\begin{aligned} 2x - 6y &= 12 \\ -x + 3y &= -6 \end{aligned}$$

d)
$$\begin{aligned} x - 2y &= -6 \\ 6y - 3x &= -18 \end{aligned}$$

2. Solve the system:

$$\begin{aligned} 3x + 2y - 4z &= 5 \\ 2x - 2y + 4z &= 10 \\ -6x + 3y + 2z &= 0 \end{aligned}$$

3. Solve the system:

$$\begin{aligned} 4x + 5y &= 7 \\ 2y - 3z &= -9 \\ 8x + 3y + 2z &= 3 \end{aligned}$$

4. Solve the system:

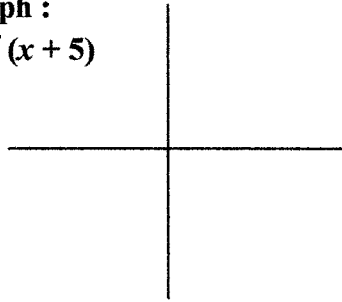
$$\begin{aligned} y &= 3x + 10 \\ y &= x^2 + 6x \end{aligned}$$

5. Solve the system:

$$\begin{aligned} 4x^2 - 9y^2 &= 448 \\ x - 2y &= 7 \end{aligned}$$

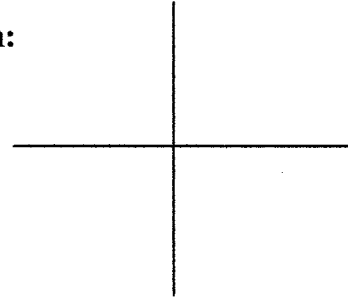
6. Find all roots and graph :

a) $y = (x + 2)^2 (x - 1)^4 (x + 5)$



7. Graph the intersection:

$$\begin{aligned}x &< 0 \\2x - 3y &\leq 12 \\y &< \frac{3}{7}x + 2\end{aligned}$$



Use #6a) to solve for x and give interval notation for:

b) $(x + 3)^2 (x - 2)^4 (x - 6) > 0$

c) $(x + 3)^2 (x - 2)^4 (x - 6) \geq 0$

8. Find the remainder if $x^4 + 6x^3 + 2$ is divided by $x - 3$.

9. Find a quadratic equation whose roots are $x = -10$ and $x = 4$.

10. Find an equation whose roots are $x = -5$, $x = -12$ and $x = 4 \pm i\sqrt{2}$.

In 11 - 13, find all roots and multiplicities by synthetic division:

11. $x^3 - 3x^2 - 22x + 24 = 0$

12. $x^4 - 4x^3 - 16x^2 + 16x + 48 = 0$

13. Use your calculator to find all roots. Verify by synthetic division.

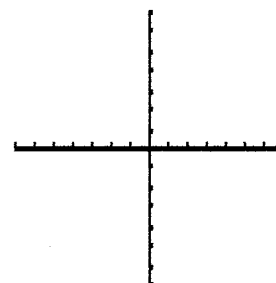
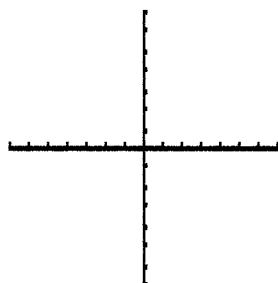
Give irrational (decimal) roots in exact radical form:

$x^4 - 8x^3 - 8x^2 + 72x + 96 = 0$

In 14 - 15, give the roots (and multiplicities) and sketch the graphs:

14. $y = x^3 - 16x^2$

15. $y = (x - 2)(x + 3)^4(x - 4)^2$

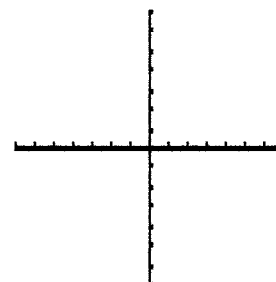
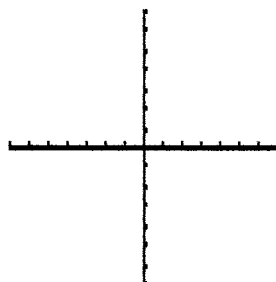


In 16 - 17, solve the inequalities. Give interval notation.

Sketch graphs when using graphing methods.

16. $|3x + 8| < 8$ (Give exact form!)

17. $-x^2 + 6x \leq -16$



COLLEGE ALGEBRA EXAM 3YG Solutions

[POLYSMT]

1a) $-3x + 7y = 4$
 $2x - 3y = -6$
 PolySmt: $(-6, -2)$

b) $12y + 5x = 41$
 $x = 4 - 3y$
 $5x + 12y = 41$
 $x + 3y = 4$
 PolySMT: $(25, -7)$

c) $2x - 6y = 12$
 $2(-x + 3y) = -6$
 $2x - 6y = 12$
 $-2x + 6y = -12$
 $0 = 0$
 Same Line

d) $(x - 2y)^3 = (-6)$
 $6y - 3x = -18$
 $3x - 6y = 18$
 $-3x + 6y = -18$
 $0 = -36$
 No Solution
 Parallel Lines

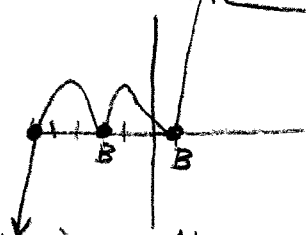
2. $3x + 2y - 4z = 5$
 $2x - 2y + 4z = 10$
 $-6x + 3y + 2z = 0$
 $x = 3, y = 4, z = 3$

3. $4x + 5y + 0z = 7$
 $0x + 2y - 3z = -9$
 $8x + 3y + 2z = 3$
 $x = -2, y = 3, z = 5$

4. $y = 3x + 10$
 $y = x^2 + 6x$
 $3x + 10 = x^2 + 6x$
 $-3x - 10 = -3x - 10$
 $0 = x^2 + 3x - 10$
 $0 = (x + 5)(x - 2)$
 $x = -5, x = 2$
 $y = 3x + 10$
 $y = 3(-5) + 10 = -5$
 $y = 3(2) + 10 = 16$
 $(-5, -5), (2, 16)$

5. $4x^2 - 9y^2 = 448$
 $x - 2y = 7$
 $x = 2y + 7$
 $4(2y + 7)^2 - 9y^2 = 448$
 $4(4y^2 + 28y + 49) - 9y^2 = 448$
 $16y^2 + 112y + 196 - 9y^2 = 448$
 $7y^2 + 112y - 252 = 0$
 $7(y^2 + 16y - 36) = 0$
 $7(y + 18)(y - 2) = 0$
 $y = -18, y = 2$
 $x = 2y + 7$
 $x = 2(-18) + 7 = -29$
 $x = 2(2) + 7 = 11$
 $(-29, -18), (11, 2)$

6a) $y = (x + 2)^2(x - 1)^4(x + 5)$
 Degree = 7
 Roots: $x = -2$ (m2) B
 $x = 1$ (m4) B
 $x = -5$ (m1) P

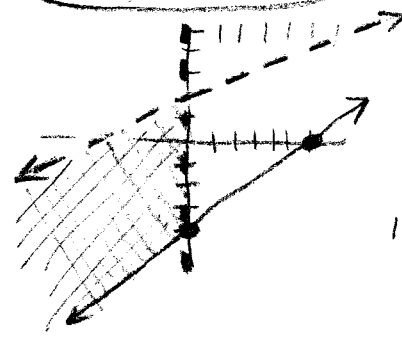


b) $(x + 2)^2(x - 1)^4(x + 5) > 0$ Above x-axis!
 $(-5, -2) \cup (-2, 1) \cup (1, \infty)$
 c) $(x + 2)^2(x - 1)^4(x + 5) \geq 0$ On or above x-axis!
 $[-5, \infty)$

7. $x < 0$ (Left of y-axis!)
 $2x - 3y \leq 12$

x	y
0	-4
6	0

 Solid Line
 Shade Above
 $y < \frac{3}{2}x + 2$
 $y_{int} = 2$
 $m = \frac{3}{2}$
 Dotted Line
 Shade Below



8. $P(x) = x^4 + 6x^3 + 2$
 $P(3) = 3^4 + 6 \cdot 3^3 + 2 = 245$

2	3	1	6	0	0	2
		3	27	81	243	
		4	27	81	245	

9. $x = -10, x = 4$
 $(x + 10)(x - 4) = 0$
 $x^2 + 6x - 40 = 0$

10. $x = -5, x = -12, x = 4 \pm i\sqrt{2}$
 $(x + 5)(x + 12) = 0$
 $x - 4 = \pm i\sqrt{2}$
 $(x - 4)^2 = (\pm i\sqrt{2})^2$
 $x^2 - 8x + 16 = -2$
 $(x^2 + 17x + 60)(x^2 - 8x + 18) = 0$

11. $x^3 - 3x^2 - 22x + 24 = 0$

1	1	-3	-22	24	
		1	-2	-24	
		1	-2	-24	0

 $x^2 - 2x - 24 = 0$
 $(x - 6)(x + 4) = 0$
 $x = 1, x = 6, x = -4$

12. $x^4 - 4x^3 - 16x^2 + 16x + 48 = 0$

2	1	-4	-16	16	48	
		2	-4	-40	-48	
		1	-2	-20	-24	0
			-2	8	24	
			1	-4	-12	0

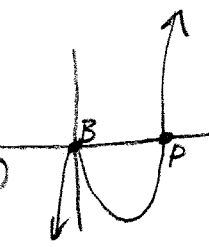
 $x^2 - 4x - 12 = 0$
 $(x - 6)(x + 2) = 0$
 $x = 6, x = -2$
 $x = 2, x = 6, x = -2$ (mult 2)

13. $x^4 - 8x^3 - 8x^2 + 72x + 96 = 0$

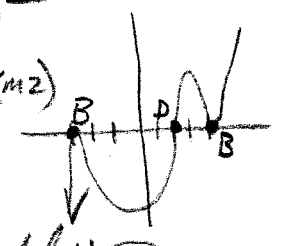
-2	1	-8	-8	72	96	
		-2	20	-24	-96	
	4	1	-10	12	48	0
			4	-24	-48	
			1	-6	-12	0

 $x^2 - 6x - 12 = 0$
 $x^2 - 6x + \underline{\quad} = 12 + \underline{\quad}$
 $x^2 - 6x + 9 = 12 + 9$
 $(x - 3)^2 = 21$
 $x = 3 \pm \sqrt{21}$

14. $y = x^3 - 16x^2$
 $x^2(x - 16) = 0$
 $x = 0$ (m2) $x = 16$



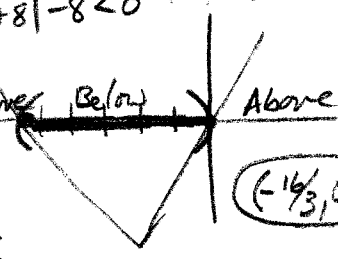
15. $y = (x - 2)(x + 3)^4(x - 4)$
 Degree = 7
 $x = 2, x = -3$ (m4), $x = 4$ (m2)



16. $|3x + 8| < 8$ Below x-axis!
 $y = |3x + 8| - 8 < 0$

3x + 8 = 8	3x = 0	x = 0
3x + 8 = -8	3x = -16	x = -16/3

 $(-\frac{16}{3}, 0)$



17. $-x^2 + 6x \leq -16$
 $y = -x^2 + 6x + 16 \leq 0$ On or below x-axis!
 $(-\infty, -2] \cup [8, \infty)$

