COLLEGE ALGEBRA EXAM 3 JG R^2 NAME _____

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:

a) $9x - 4y = 2$
$2x + 5y = -29$

b) $x = 2y + 6$
$6y - 8x = 32$

c) $3x + 2y = 6$
$y = -3/2\,x$

d) $x - 2y = 6$
$6y - 3x = -18$

2. Solve the system:

$4x - y + 3z = 0$
$2x + 3y - z = 4$
$x + 2y + 6z = -18$

3. Solve the system:

$4x + 2y + 3z = 6$
$x - y + z = 2$
$-x + 4z = 8$

4. Solve the system:

$y = 3x + 10$
$y = x^2 + 6x$

5. Solve the system:

$x^2 - 2xy + y^2 = 25$
$y - 2x = 1$

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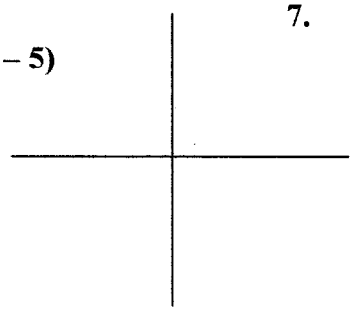
6. **Graph :**

a) $y1 = (x-3)^2 (x+2)^4 (x-5)$

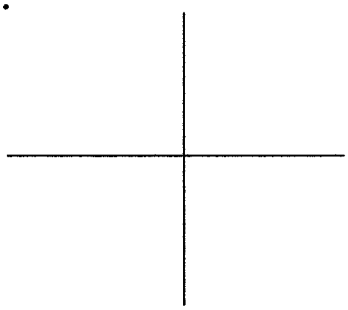


7. **Graph the intersection:**

$x > 0$

$2x + 3y \geq 12$

$7x - 4y < 28$



Solve for x and give interval notation for:

b) $(x-3)^2 (x+2)^4 (x-5) < 0$

c) $(x-3)^2 (x+2)^4 (x-5) \leq 0$

8. **Find the remainder if $x^5 - 6x^2 + 3$ is divided by $x + 2$.**

9. **Find a quadratic equation whose roots are $x = -5$ and $x = 7$.**

10. **Find an equation whose roots are $x = -5$ and $x = -3 \pm i\sqrt{2}$.**

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

11. $x^3 - 5x^2 + 7x - 3 = 0$

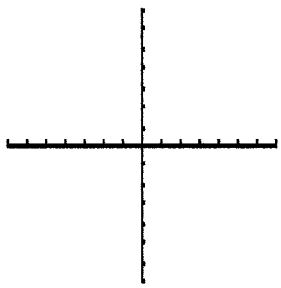
12. $x^4 + 2x^3 - 16x^2 - 2x + 15 = 0$

13. Use your calculator to find all roots. Verify by synthetic division. Give irrational roots in radical form:

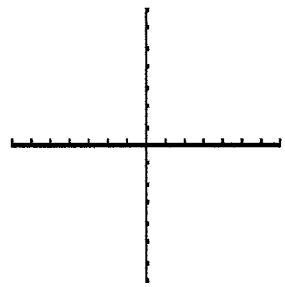
$x^4 - 9x^3 + 6x^2 + 66x + 20 = 0$

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

14. $y = x^3 - 13x^2 - 30x$

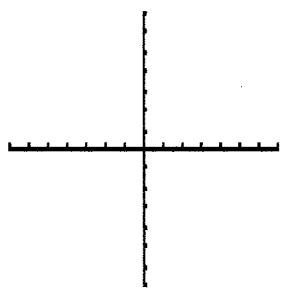


15. $y = x^5 + 2x^4 - 4x^3 - 8x^2$

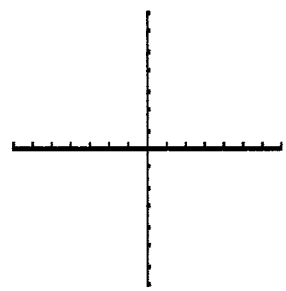


In 16 - 17, solve the inequalities. Give interval notation. Sketch graphs when using graphing methods.

16. $|x - 8| \geq 6$



17. $-7x^2 + 3x < 0$ **(Give exact form!)**



COLLEGE ALGEBRA EXAM 3 JG Solutions

1a) $9x-4y=2$, $2x+5y=-29$ — Calculator $(-2,-5)$

b) $x=2y+6$, $6y-8x=32$, $x-2y=6$, $-8x+6y=32$ — Calculator $(-10,-8)$

c) $3x+2y=6$, $y=-\frac{3}{2}x$, $3x+2(-\frac{3}{2}x)=6$, $3x-3x=6$, $0=6$ — No Solution, Parallel Lines

d) $x-2y=6$, $6y-3x=-18$, $3(x-2y=6)$, $-3x+6y=-18$, $3x-6y=18$, $-3x+6y=-18$, $0=0$ — Same Line

2. $4x-y+3z=0$, $2x+3y-z=4$, $x+2y+6z=-18$ — Calculator $(2,-1,-3)$

3. $4x+2y+3z=6$, $x-y+z=2$, $-x+4z=8$ — Calculator: $(0,0,2)$

4. $y=3x+10$, $y=x^2+6x$

$3x+10=x^2+6x$

$0=x^2+3x-10$

$0=(x+5)(x-2)$

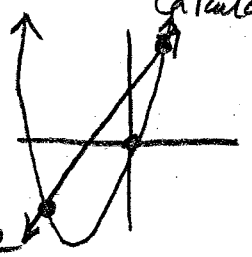
$x=-5$ $x=2$

$y=3x+10$ $y=3x+10$

$y=-15+10$ $y=6+10$

$y=-5$ $y=16$

$(-5,-5)$ $(2,16)$



5. $x^2-2xy+y^2=25$, $y=2x+1$

$x^2-2x(2x+1)+(2x+1)^2=25$

$x^2-4x^2-2x+4x^2+4x+1=25$

$x^2+2x-24=0$

$(x+6)(x-4)=0$

$x=-6$ $x=4$

$y=2x+1$ $y=2x+1$

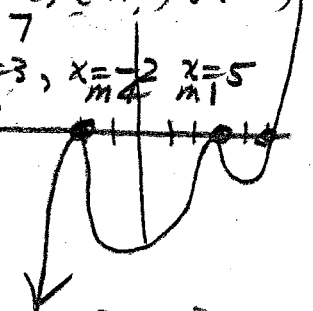
$y=2(-6)+1=-11$ $y=2(4)+1=9$

$(-6,-11)$ $(4,9)$

6a) $y1=(x-3)^2(x+2)^4(x-5)$

Degree = 7

Roots: $x=3$ m 2, $x=-2$ m 4, $x=5$ m 1



b) $(x-3)^2(x+2)^2(x-5)<0$

Below x axis

$(-\infty,-2)\cup(-2,3)\cup(3,5)$

c) $(x-3)^2(x+2)^2(x-5)\leq 0$

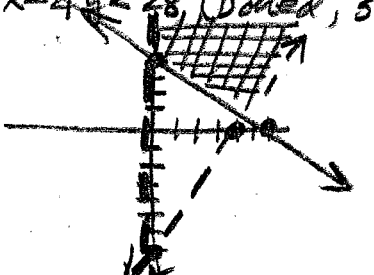
welded rails! Include endpoints!

$(-\infty,5]$

7. $x>0$ (Dotted, shade right)

$2x+3y\geq 12$ (Solid line, shade above)

$7x-4y<28$ (Dotted, shade above)



8. $(x^5-6x^2+3)\div(x+2)$

$P(-2)=(-2)^5-6(-2)^2+3$

$=-32-24+3$

$=-53$

-OR-

-2 | 1 0 0 −6 0 3

↓ −2 4 −8 16 −32

1 −2 4 −14 28 −53

9. $x=-5$ $x=7$

$(x+5)(x-7)=0$

$x^2-2x-35=0$

10. $x=-5$ $x=-3\pm 6\sqrt{2}$

$(x+5)[(x+3)=\pm 6\sqrt{2}]$

$(x+3)^2=(\pm 6\sqrt{2})^2$

$x^2+6x+9=36\cdot 2=72$

$(x+5)(x^2+6x+11)=0$

11. $x^3-5x^2+7x-3=0$

3 | 1 −5 7 −3

↓ 3 −6 3

1 −2 1 0

$x^2-2x+1=0$

$(x-1)^2=0$

$x=3$, $x=1$ (mult 2)

12. $x^4+2x^3-16x^2-2x+15=0$

1 | 1 2 −16 −2 15

↓ 1 3 −13 −15

1 3 −13 −15 0

−1 | ↓ −1 −2 15

1 2 −15 0

$x^2+2x-15=0$

$(x+5)(x-3)=0$

$x=\pm 1$, $x=-5$ $x=3$

13. $x^4-9x^3+6x^2+66x+20=0$

−2 | 1 −9 6 66 20

↓ −2 22 −56 −20

5 | 1 −11 28 10 0

↓ 5 −30 −10

1 −6 −2 0

$x^2-6x-2=0$

$x^2-6x+9=2+9$

$(x-3)^2=11$

$x-3=\pm\sqrt{11}$

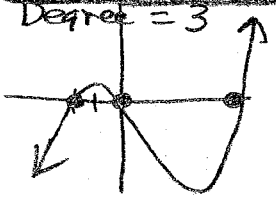
$x=3\pm\sqrt{11}$, $x=-2$, $x=5$

14. $y=x(x^2-13x-30)$

$y=x(x-15)(x+2)$

Roots $x=0, 15, -2$

Degree = 3

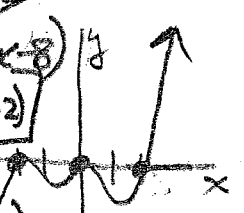


15. $y=x^2(x^3+2x^2-4x-8)$

$y=x^2[x^2(x+2)-4(x+2)]$

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

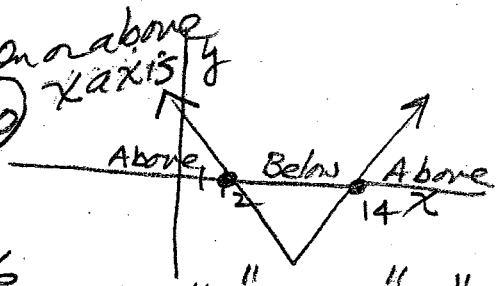
$y=x^2(x+2)(x+2)(x-2)$



Roots: $x=0$ (mult 2) $x=-2$ (mult 2) $x=2$

16. $|x-8| \geq 6$ on or above x axis

$y_1 = |x-8| - 6 \geq 0$



ROOTS:

$x-8=6$ $+8\ +8$ $x=14$

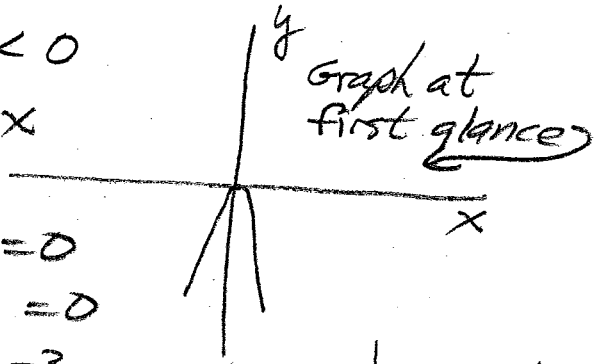
$x-8=-6$ $+8\ +8$ $x=2$

-OR- Use "ROOT" or "zeros" method to find roots.

ANSWER: $(-\infty, 2] \cup [14, \infty)$

17. $-7x^2+3x < 0$

$y_1 = -7x^2+3x$



Graph at first glance

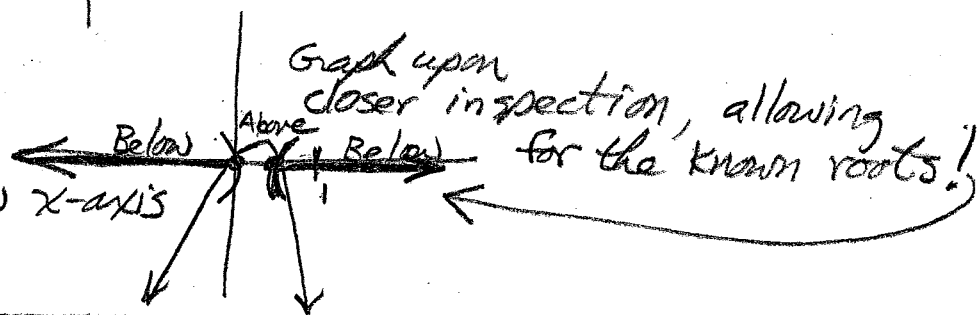
ROOTS:

$-7x^2+3x=0$

$x(-7x+3)=0$

$x=0$ $-7x=-3$

$x=3/7$



Graph upon closer inspection, allowing for the known roots!

Below x-axis

$y_1 = -7x^2+3x < 0$

ANSWER: $(-\infty, 0) \cup (3/7, \infty)$