COLLEGE ALGEBRA EXAM 3 IGR 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.

In 1 – 4, Solve the systems of equations. (Explain or show what you did.)

1a) $2x + 4y = 16$
$3x - 5y = -9$

b) $2x - 3y = -8$
$6y = 4x + 16$

2a) $3x - 2y = 10$
$y = -4x + 28$

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

3. **Solve the system:**
$3x + 2y + z = 23$
$2x + y + z = 11$
$x - 3y - z = 10$

4. **Solve the system:**
$8x + 3y + 2z = 3$
$4x + 5y = 7$
$2y - 3z = -9$

5. **Solve the system:**
$xy = -12$
$y = 2x + 11$

6. **Solve the system:**
$x + y = 4$
$x^2 - y = 2$

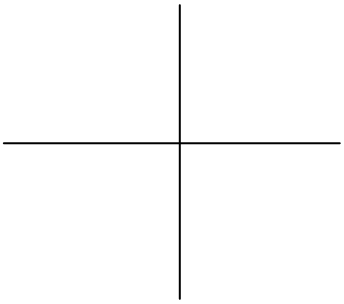
7. **Find the remainder if $x^4 + 6x + 2$ is divided by $x + 2$.**

COLLEGE ALGEBRA EXAM 3 IGR R^2 NAME _____

8. Find a quadratic equation whose roots are $x = 7$ and $x = -8$.

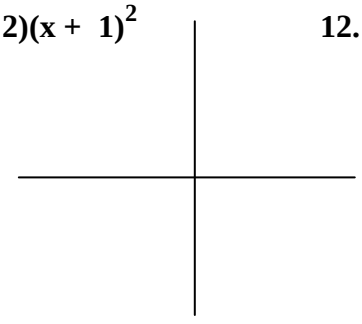
9. Find an equation whose roots are $x = 2$ and $x = -3 \pm 5i$.

10. Graph the intersection: $x - y < 5$
$y = -3x + 6$
$x = 0$

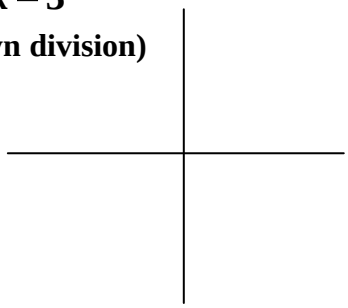


In 11 – 12, sketch the graphs, give roots and y intercepts:

11a) $y = (x-3)^2 (x+4)^3 (x-2)(x+1)^2$



12. $y = x^3 - 5x^2 + 7x - 3$
(Verify roots by syn division)



Solve for x and give interval notation for:

b) $(x-3)^2 (x+4)^3 (x-2)(x+1)^2 < 0$

c) $(x-3)^2 (x+4)^3 (x-2)(x+1)^2 > 0$

COLLEGE ALGEBRA EXAM 3 IGR R^2 NAME _____

In 13 - 15, find all roots and multiplicities (verify by synthetic division):

13. $x^3 - 6x^2 + 12x - 8 = 0$

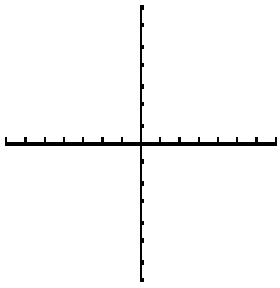
14. $x^4 + 9x^3 + 21x^2 - x - 30 = 0$

15. Find all roots. Give irrational roots in radical form:

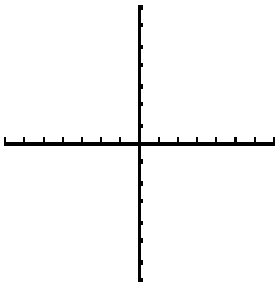
$x^4 - 9x^3 + 18x^2 + 14x - 24 = 0$

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

16. $x^2 + 13x - 30 \geq 0$



17. $|6x - 5| < 19$ **(Give exact form!)**



College Algebra Exam 3 IGR Solutions

1a) $2x+4y=16$, $3x-5y=-9$ — [Polysimult] $x=2, y=3$ $(2,3)$

b) $2x-3y=-8$, $6y=4x+16\ (\div 2)$, $2x-3y=-8$, $-2x+3y=8$, $0=0$ — Same Line

2a) $3x-2y=10$, $y=-4x+28$ — Use [Polysimult] or Substitution — $x=6, y=4$ $(6,4)$

b) $3(x-2y=-6)$, $-3x+6y=-18$, $3x-6y=-18$, $-3x+6y=-18$, $0=-18$ — No Solution, Lines are Parallel

3. $3x+2y+z=23$, $2x+y+z=11$, $x-3y-z=10$ — [Polysimult] $(9,3,-10)$

4. $8x+3y+2z=3$, $4x+5y+0z=7$, $0x+2y-3z=-9$ — [Polysimult] $(-2,3,5)$

5. $xy=-12$, $y=2x+11$, $x(2x+11)=-12$, $2x^2+11x+12=0$, $(2x+3)(x+4)=0$, $x=-3/2$ $x=-4$, $y=8$ $y=3$ — $(-3/2,8)$ $(-4,3)$

6. $x+y=4$, $x^2-y=2$, $x^2+x=6$, $x^2+x-6=0$, $(x+3)(x-2)=0$, $x=-3$ $x=2$, $y=7$ $y=2$ — $(-3,7)$ $(2,2)$

7. $x^4+6x+2 \div (x+2)$

$P(-2)=(-2)^4+6(-2)+2$

$=16-12-2$

$=6$

OR

-2 | 1 0 0 6 2

↓ −2 4 −8 4

1 −2 4 −2 (6)

8. $x=7, x=-8$, $(x-7)(x+8)=0$ — $x^2+x-56=0$

9. $x=2$, $(x-2)=0$

$x=-3\pm 5i$, $(x+3)=\pm 5i$, $(x+3)^2=25i^2$, $x^2+6x+9=-25$ — $(x-2)(x^2+6x+34)=0$

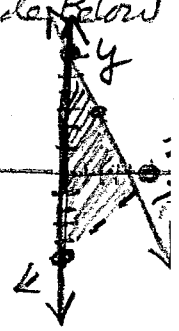
10. $x-y<5$

x	y
0	−5
5	0

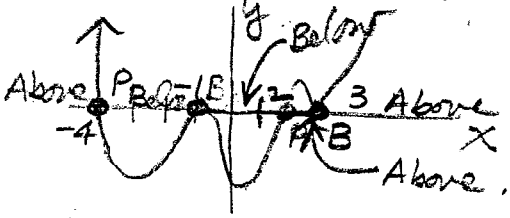
Dotted Line, Shade Above

$y\le -3x+6$, y int $=6$, $m=-\frac{3}{1}$ rise / run, Solid Line, Shade Below

$x\ge 0$, Vertical Line (y axis!), Shade Right, Solid Line



11a) $y=(x-3)^2(x+4)^3(x-2)(x+1)^2$



a) <0: Below x axis! $(-4,-1)\cup(-1,2)$

b) >0: Above! $(-\infty,-4)\cup(2,3)\cup(3,\infty)$

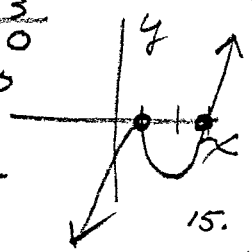
12. $y=x^3-5x^2+7x-3$

3 | 1 −5 7 −3

↓ 3 −6 3

1 −2 1 0

$x^2-2x+1=0$, $(x-1)^2=0$, $x=1$ mult 2



13. $x^3-6x^2+12x-8=0$

$x=2$ | 1 −6 12 −8

↓ 2 −8 8

1 −4 4 0

$(x^2-4x+4)=0$, $(x-2)^2=0$ — $x=2$ (mult 3)

14. $x^4+9x^3+21x^2-x-30=0$

1 | 1 9 21 −1 −30

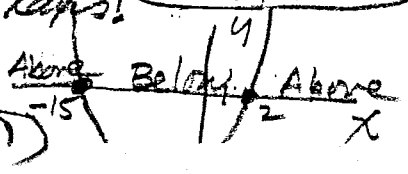
↓ 1 10 31 30

−2 | 1 10 31 30 0

↓ −2 −16 −30

1 8 15 0

$x^2+8x+15=0$, $(x+5)(x+3)=0$ — $x=-5$ $x=-3$, $x=1$, $x=-2$



15. $x^4-9x^3+18x^2+14x-24=0$

1 | 1 −9 18 14 −24

↓ 1 −8 10 24

4 | 1 −8 10 24 0

↓ 4 −16 −24

1 −4 −6 0

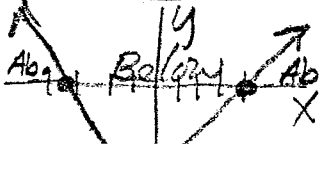
$x^2-4x-6=0$, $x^2-4x+4=6+4$, $(x-2)^2=10$, $x-2=\pm\sqrt{10}$ — $x=2\pm\sqrt{10}, 1, 4$

16. $x^2+13x-30\ge 0$, $(x+15)(x-2)=0$, $x=-15$ $x=2$ — $(-\infty,-15]\cup[2,\infty)$

17. $|6x-5|<19$

$6x-5=19$, $6x=24$, $x=4$

$6x-5=-19$, $6x=-14$, $x=-7/3$



$(-7/3,4)$