COLLEGE ALGEBRA EXAM 3 EG2 R^2 NAME _____

SHOW ALL WORK ON THIS TEST OR ON SEPARATE PAPER. Circle answers. TURN IN ALL WORKSHEETS. WHERE CALCULATORS ARE USED, BE SURE TO DESCRIBE PROCEDURES AND/OR SKETCH GRAPHS.

1. Evaluate the determinants:

a) $\begin{vmatrix} 7 & -4 \\ -3 & -2 \end{vmatrix}$ b) $\begin{vmatrix} 3 & 2 \\ 5 & 0 \end{vmatrix}$

2. Evaluate the determinant:

$$\begin{vmatrix} 6 & -3 & -5 \\ 0 & 7 & 4 \\ 5 & 9 & -8 \end{vmatrix}$$

3. Solve the systems of equations:

a) $9X - 4Y = 2$
$2X + 5Y = -29$

b) $X = 3Y + 18$
$6Y - 2X = -36$

4. Solve by Cramer's Rule:

$2X + 7Y = -7$
$3X + Y = 18$

5. Graph the intersection:

$X - 2Y \leq 6$
$Y > -X + 2$
$Y \geq 0$

6. Solve the system:

$$\begin{aligned} 4X + 5Y - 3Z &= -5 \\ 2X - 3Y - 2Z &= 1 \\ 7X + 4Y - 4Z &= 1 \end{aligned}$$

7. Solve the system:

$$\begin{aligned} XY &= 28 \\ Y &= 3X - 5 \end{aligned}$$

8. Find the remainder if $X^7 + 6X + 3$ is divided by $X + 2$.

9. Find a quadratic equation whose roots are $X = -4 \pm 3i$.

10. Solve for X, using synthetic division and graphing calculators. Give irrational roots in radical form:

$$X^4 - 12X^3 + 43X^2 - 42X - 18 = 0$$

In 11 - 12, find all roots and multiplicities:

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

12. $X^4 + 6X^3 + 9X^2 - 4X - 12 = 0$

In 13 - 14, sketch the graphs (give roots and Y intercepts):

13. $Y = -(X + 2)^3(X - 3)^2(X + 4)^2$

14. $Y = X^4 - 2X^3 - 8X^2$

In 15 - 17, solve the inequalities and give interval notation:

15. $X^2 + 10X - 24 \geq 0$

16. $\frac{12}{X} > 3X$

17. $\frac{X^2 - 3X - 10}{(X + 3)^2} \leq 0$

COLLEGE ALGEBRA EXAM 3 EG2 Solutions

2nd simult does not work

1a) $\begin{vmatrix} 7 & -4 \\ -3 & -2 \end{vmatrix} = -14-12 = \boxed{-28}$

b) $\begin{vmatrix} 3 & 2 \\ 5 & 0 \end{vmatrix} = 0-10 = \boxed{-10}$

3. $\begin{vmatrix} 6 & -3 & -5 \\ 0 & 7 & 4 \\ 5 & 9 & -8 \end{vmatrix} = \boxed{-437}$

4a) $8x-4y=2$, $2x+5y=-29$ — 2nd Simult: $\boxed{(-2,-5)}$

b) $x=3y+18$, $6y-2x=-36$

$6y-2(3y+18)=-36$

$6y-6y-36=-36$

$-36=-36$

$\boxed{\text{Same Line}}$

4. $2x+7y=-7$, $3x+y=18$

$x=\dfrac{\begin{vmatrix} -7 & 7 \\ 18 & 1 \end{vmatrix}}{\begin{vmatrix} 2 & 7 \\ 3 & 1 \end{vmatrix}} = \dfrac{-133}{-19} = \boxed{7}$

$y=\dfrac{\begin{vmatrix} 2 & -7 \\ 3 & 18 \end{vmatrix}}{\begin{vmatrix} 2 & 7 \\ 3 & 1 \end{vmatrix}} = \dfrac{57}{-19} = \boxed{-3}$

5. $x-2y\le 6$

x	y
0	-3
6	0

Solid Line

Shade above

$y>-x+2$

y int $=2$

$m=-1$

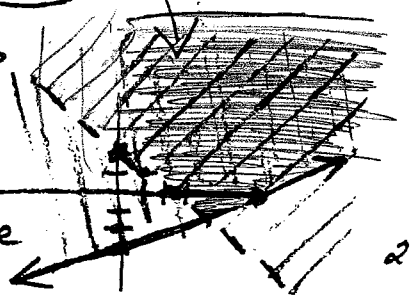
Dotted Line

Shade above

$x\ge 0$

y axis

Shade right



6. $4x+5y-3z=-5$

$2x-3y-2z=1$

$7x+4y-4z=1$

2nd Simult; Nocer = 3

$\boxed{(3,-1,4)}$

7. $xy=28$ OR $y=3x-5$

$x(3x-5)=28$

2nd Poly → $3x^2-5x-28=0$

$(3x+7)(x-4)=0$

$\boxed{x=-\frac{7}{3} \quad x=4}$

$\boxed{y=-12 \quad y=7}$

Graph $y_1=\frac{28}{x}$, $y_2=3x-5$, ISECT

8. $P(x)=x^7+6x+3$

$P(-2)=(-2)^7+6(-2)+3$

$=\boxed{-137}$

You may use $y_1=x^7+6x+3$ and Eval

9. $x=-4\pm 3i$

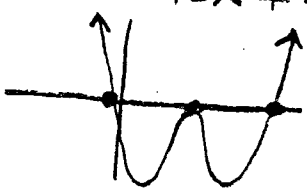
$x+4=\pm 3i$

$(x+4)^2=(\pm 3i)^2$

$x^2+8x+16=9i^2=-9$

$\boxed{x^2+8x+25=0}$

10. $x^4-12x^3+43x^2-42x-18=0$



3	1	-12	43	-42	-18
	↓	3	-27	48	18
3	1	-9	16	6	0
	↓	3	-18	-6	
	1	-6	-2	0	

$x=-.3166\ldots$

$x=3$ (mult 2)

$x=6.3166\ldots$

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

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

$(x-3)^2=11$

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

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

$\boxed{x=3 \text{ mult } 2}$

11. $x^3-3x^2-22x+24=0$ ← 2nd POLY

-4	1	-3	-22	24
		-4	28	-24
	1	-7	6	0

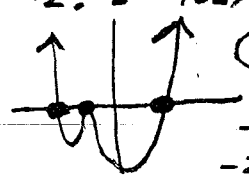
$x^2-7x+6=0$

$(x-6)(x-1)=0$

$\boxed{x=6, x=1 \quad x=-4}$

Also use 2nd POLY

12. 2nd POLY Does not work!



$\boxed{x=1, -2 \text{ (mult 2)}, -3}$

-3	1	6	9	-4	-12
	↓	1	7	16	12
	1	7	16	12	0
	↓	-2	-10	-12	
	1	5	6	0	

$(x+3)(x+2)=0$

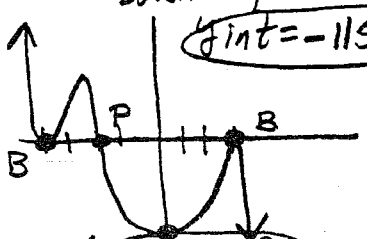
$x=-3 \quad x=-2$

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

Degree 7

Opens up left, Down right.

y int $=-1152$



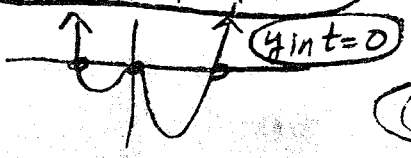
Roots: $x=-2$ P, $x=3$ B, $x=-4$ B

14. $y=x^4-2x^3-8x^2$

$x^2(x^2-2x-8)$

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

$\boxed{x=0 \quad x=4 \quad x=-2}$



$\boxed{y\text{int}=0}$

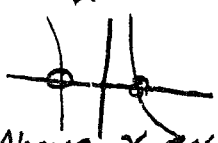
15. $x^2+10x-24\ge 0$

$(x+12)(x-2)=0$

$x=-12 \quad x=2$

$\boxed{(-\infty,-12]\cup[2,\infty)}$

16. $y_1=\frac{12}{x}-3x$



Above x axis:

$\boxed{(-\infty,-2)\cup(0,2)}$

17. $\dfrac{x^2-3x-10}{(x+3)^2}\le 0$

On or below

$\boxed{[-2,5]}$