COLLEGE ALGEBRA EXAM 3 HG1 $R^2$ NAME _____

SHOW ALL WORK ON THIS TEST OR ON SEPARATE PAPER. Circle answers.
TURN IN ALL WORKSHEETS. CALCULATORS ARE REQUIRED ON THIS TEST.
EXPLAIN OR DESCRIBE CALCULATOR METHODS. SKETCH AND LABEL ALL GRAPHS!

1. Evaluate the determinants:

a) $\begin{vmatrix} 6 & -3 \\ 3 & -2 \end{vmatrix}$ b) $\begin{vmatrix} 3 & -3 \\ 1 & -1 \end{vmatrix}$

2. Evaluate the determinant:

$$\begin{vmatrix} 3 & 2 & -1 \\ -2 & 0 & 5 \\ -2 & 8 & 6 \end{vmatrix}$$

3. Solve the systems of equations:

a) $-3X + 7Y = 4$
$2X - 3Y = -6$

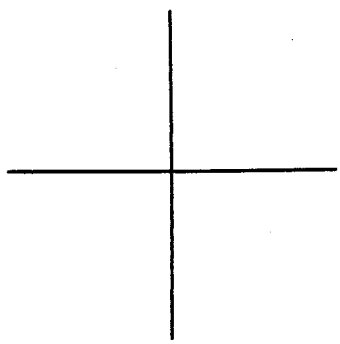
b) $2Y - 5X = 10$
$10X = 4Y - 20$

4. Solve by Cramer's Rule:

$8X - 6Y = -32$
$X - 2Y = 6$

5. Graph the intersection:

$X + 2Y \geq -4$
$X - 2Y > -4$
$X > 0$



6. Solve the system:

$$\begin{aligned} 3X + 2Y - 4Z &= 5 \\ X - Y + 2Z &= 5 \\ -6X + 3Y + 2Z &= 0 \end{aligned}$$

7. Solve the system:

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

8. Solve the system:

$$\begin{aligned} Y &= X^2 - 1 \\ Y &= 3X + 9 \end{aligned}$$

9. Solve the system:

$$\begin{aligned} X^2 - 2XY + Y^2 &= 49 \\ Y - 3X &= -5 \end{aligned}$$

10. Find the remainder if $X^5 - 2X + 1$ is divided by $X + 1$.

11. If $P(X) = X^5 - 7X^4 + 16X^3 - 8X - 20$, find $P(-2)$

12. Find a quadratic equation whose roots are $X = -3 \pm 5i$.

13. Solve for X, giving radical form of roots. (Use calculators and sythetic division to show your work! Tell what you did.)

$$X^4 - 9X^3 + 6X^2 + 48X + 32 = 0$$

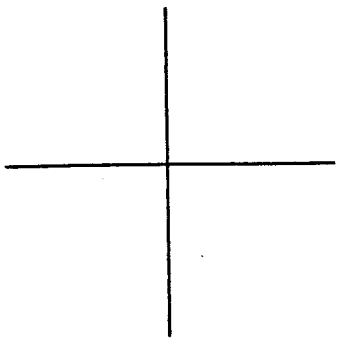
In 14 - 15, find all roots and multiplicities.
(Use calculators, but show work with synthetic division.):

14. $X^3 + 2X^2 - 7X + 4 = 0$

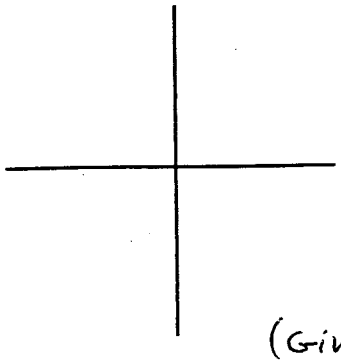
15. $X^4 + 2X^3 - 7X^2 - 8X + 12 = 0$

In 16 - 17, sketch the graphs (give X and Y intercepts):

16. $Y = (X - 3)(X - 1)^2(X - 2)(X + 2)^4$



17. $Y = X^5 - 121X^3$



18. Solve the inequality.
Give interval notation.

$$|6 - 3x| \geq 16$$

19. Solve the inequality. (Give ROOTS + Asym
Give interval notation.

$$\frac{(X - 4)^2}{X(X + 12)} > 0$$

# College Algebra EXAM 3 HG1 Solutions

1a) $\begin{vmatrix} 6 & -3 \\ 3 & -2 \end{vmatrix} = -12-(-9)$ $= \boxed{-3}$

b) $\begin{vmatrix} 3 & -3 \\ 1 & -1 \end{vmatrix} = -3-(-3)$ $= \boxed{0}$

2. $\begin{vmatrix} 3 & 2 & -1 \\ -2 & 0 & 5 \\ -2 & 8 & 6 \end{vmatrix} =$ 2nd Matrix $\boxed{-100}$

3a) $-3x+7y=4$
$2x-3y=-6$
2nd Simult $\boxed{(-6,-2)}$

3b) $2(-5x+2y=10)$
$10x-4y=-20$
2nd Simult = Error!
$-10x+4y=20$
$10x-4y=-20$
$0=0$
Same Line

2nd simult; n=3

6. $x=3, y=4, z=3$

7. $x=2, y=-4, z=-3$

4. $8x-6y=-32$
$x-2y=6$

$x=\dfrac{\begin{vmatrix} -32 & -6 \\ 6 & -2 \end{vmatrix}}{\begin{vmatrix} 8 & -6 \\ 1 & -2 \end{vmatrix}}$ $y=\dfrac{\begin{vmatrix} 8 & -32 \\ 1 & 6 \end{vmatrix}}{-10}$

$x=\dfrac{64-(-36)}{-16-(-6)}$ $y=\dfrac{48-(-32)}{-10}$

$x=\dfrac{100}{-10}=\boxed{-10}$ $y=\dfrac{80}{-10}=\boxed{-8}$

5. $x+2y\geq -4$

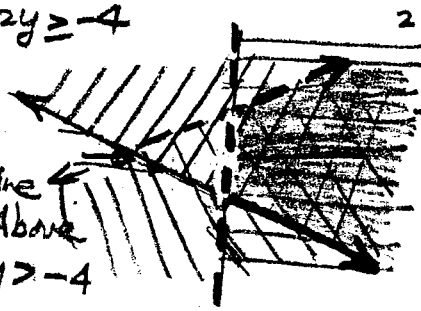
| x | y |
|---|---|
| 0 | -2 |
| -4 | 0 |

Solid Line
Shade Above

$x-2y>-4$

| x | y |
|---|---|
| 0 | 2 |
| -4 | 0 |

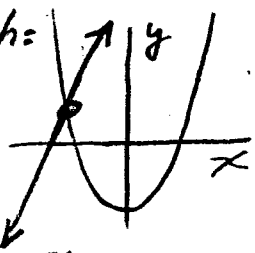
Dotted Line
Shade Below.



$x\leq 0$ $x=0$ y axis
Shade Left.

8. $y=x^2-1$
$y=3x+9$

Graph:




Alg: $x^2-1=3x+9$
$x^2-3x-10=0$
$(x-5)(x+2)=0$
$x=5$ $x=-2$
$y=25-1$ $y=4-1$
$y=24$ $y=3$
$\boxed{(5,24)\quad(-2,3)}$

TI 86:
GRAPH MORE MATH MORE
ISECT ENT ENT ENT

TI 85:
GRAPH MORE MATH MORE
ISECT ENTER ENTER

9. $x^2-2xy+y^2=49$
$y-3x=-5;\ y=3x-5$
$x^2-2x(3x-5)+(3x-5)^2=49$
$x^2-6x^2+10x+9x^2-30x+25=49$
$4x^2-20x-24=0$
$4(x^2-5x-6)=0$
$4(x-6)(x+1)=0$
$x=6$ $x=-1$
$y=3x-5$ $y=3x-5$
$=18-5$ $=-3-5$
$=13$ $=-8$
$\boxed{(6,13)\quad(-1,-8)}$

10. $(x^5-2x+1)\div(x+1)$
$P(-1)=(-1)^5-2(-1)+1$
$=-1+2+1$
$=\boxed{2}$

—or—

$-1$ | 1 0 0 0 −2 1
↓ −1 1 −1 1 −1
1 −1 1 −1 1 | 2

11. $P(x)=x^5-7x^4+16x^3-8x-20$
$P(2)=?$
GRAPH $y=x^5-7x^4+16x^3..$
EXIT MORE MORE F1
Eval $X=-2$ ENTER.
$x=-2$ $\boxed{y=-276}$

12. $x=-3\pm 5i$
$(x+3)=(\pm 5i)^2$
$x^2+6x+9=25i^2$
$x^2+6x+9=-25$
$\boxed{x^2+6x+34=0}$

13. $x^4-9x^3+6x^2+48x+32=0$
2nd Poly; Order = 4
$x_1=7.123$
$x_2=4$
$x_3=-1.123$
$x_4=-1$

4 | 1 −9 6 48 32
↓ 4 −20 −56 −32
1 −5 −14 −8 | 0
−1 | ↓ −1 6 8
1 −6 −8 | 0

$x^2-6x-8=0$
$x^2-6x+\_\_=8+\_\_$
$x^2-6x+9=8+9$
$(x-3)^2=17$
$x-3=\pm\sqrt{17}$
$\boxed{x=3\pm\sqrt{17}, 4, -1}$

14. $x^3+2x^2-7x+4=0$
2nd Poly: Order = 3
$x_1=-4$

−4 | 1 2 −7 4
↓ −4 8 −4
1 −2 1 | 0

$x^2-2x+1=0$
$(x-1)^2=0$
$\boxed{x=-4; x=1 \text{ mult } 2}$

15. $x^4+2x^3-7x^2-8x+12=0$
2nd Poly: Order = 4
$x_1=-3$ $x_2=2$ $x_3=-2$ $x_4=1$

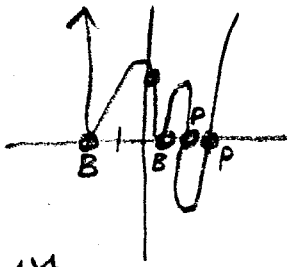
−3 | 1 2 −7 −8 12
↓ −3 3 12 −12
1 −1 −4 4 | 0
2 | ↓ 2 2 −4
1 1 −2 | 0

$(x^2+x-2)=0$
$(x+2)(x-1)=0$
$x=-3$ $x=-2$ $x=1$
$x=2$

16. $y = (x-3)(x-1)^2(x-2)(x+2)^4$

Degree = 8 opens up on both sides

| Root | mult |
|---|---|
| 3 | 1 P |
| 1 | 2 B |
| 2 | 1 P |
| −2 | 4 B |




yint ($x=0$)

$y = (-3)(-1)^2(-2)(2)^4$

$= 96$

17. $y = x^5 - 121x^3$

Degree = 5

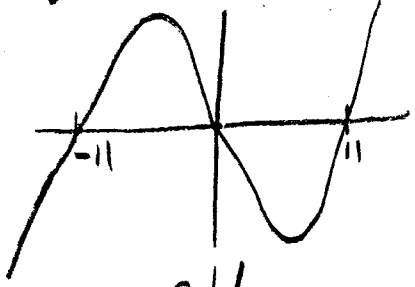
Roots: $x^3(x^2-121) = 0$

$x^3(x-11)(x+11) = 0$

$x=0 \quad x=11 \quad x=-11$

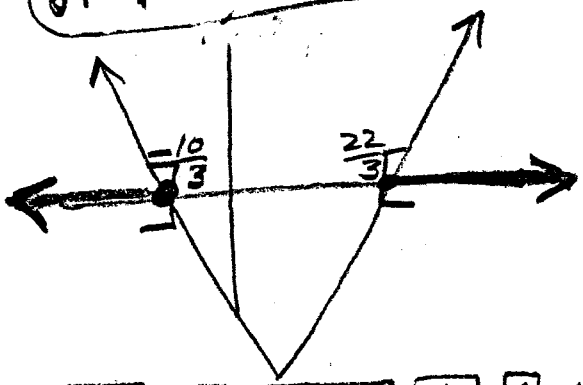
mult 3

yint: ($x=0$) $y=0$




18. $|16-3x| \geq 16$

$y = |6-3x| - 16 \geq 0$ ← on or above x axis. Graph this




GRAPH [y1] CUSTOM [abs] [ ( 6 − 3 x ) ]

− 16 ENTER EXIT EXIT

F3 ZOOM F4 STD

MORE MATH TI85 MORE ROOT etc.

after obtaining decimal values.

TI86 EXIT EXIT CUSTOM FRAC ENTER

$x = -10/3 \quad x = 22/3$

ON OR ABOVE XAXIS:

$(-\infty, -10/3] \cup [22/3, \infty)$

Algebra: Endpts $|16-3x| = 16$

$6-3x=16 \quad 6-3x=-16$

$-3x=10 \quad -3x=-22$

$x=-10/3 \quad x=22/3$

Be Careful!

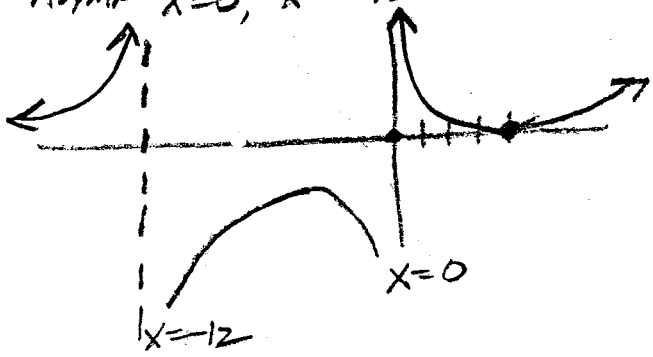
Standard Zoom looks like this:

You must either zoom or use RANGE (TI85) or WINDOW (TI86) to set XMIN = 75 ∩ −20, XMAX = 15 ∩ 20.

19. $\dfrac{(x-4)^2}{x(x+12)} \geq 0$ ↳ above x axis.

ROOT $x=4$ (mult 2)

ASYMP $x=0, \; x=-12$




Above x axis:

$(-\infty, -12) \cup (0, 4) \cup (4, \infty)$

NOTE: Be careful of root $x=4$ Bounce and especially asymptote at $x=-12$!