Ch 1-3 Review

1. $m = \frac{2-6}{9+1} = \frac{-4}{10} = -\frac{2}{5}$

$y - 2 = -\frac{2}{5}(x-9)$

$y - 2 = -\frac{2x}{5} + \frac{18}{5}$

$5y - 10 = -2x + 18$

$2x + 5y = 10 + 18$

$2x + 5y = 28$

② $(1,5)$ $(-7,10)$

$m = \frac{10-5}{-7-1} = \frac{5}{-8}$

ⓐ $m\perp = 8/5$ $(-3,9)$

$y - 9 = 8/5(x+3)$

$y - 9 = 8/5x + 24/5$

$y = 8/5x + 69/5$

ⓑ $m\parallel = -5/8$ $(-3,9)$

$y - 9 = -5/8(x+3)$

$y - 9 = -5/8x - 15/8$

$y = -5/8x + 57/8$

③ $y = 9x^2 + 30x + 25$

Axis of symmetry:

$x = \frac{-b}{2a} = \frac{-30}{2(9)} = \frac{-5}{3}$

Vertex:

$y = 9(-\frac{5}{3})^2 + 30(-\frac{5}{3}) + 25$

$= +\frac{225}{9} - \frac{150}{3} + 25 =$

$+\frac{225}{9} - 50 + \frac{225}{9}$

$= 0$

vertex $(-\frac{5}{3}, 0)$

④ $i^{711} =$

$\frac{711}{4} = 177\ R3$

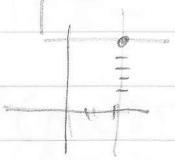
$i^{711} = i^3 = -i$

⑤ $(5+3i)^2 = 25 + 30i + 9i^2$

$25 + 30i - 9$

$16 + 30i$

⑥ Horizontal line



$y = 5$; $m = 0$

Vertical line

$x = 2$; m undefined

7 $x^4 - 5x^2 - 36 = 0$

$(x^2 - 9)(x^2 + 4) = 0$

$x^2 - 9 = 0 \rightarrow x^2 = 9 \rightarrow x = \pm 3$

$x^2 + 4 = 0 \rightarrow x^2 = -4 \rightarrow x = \pm 2i$

8 $x^3+3x^2-8x-24=0$

$(x^3+3x^2)-(8x+24)=0$

$x^2(x+3)-8(x+3)=0$

$(x^2-8)(x+3)=0$

$x^2=8 \quad | \quad x=-3$

$x=\pm 2\sqrt{2}$

9 $3x^2+x+6=0$

$x=\frac{-1\pm\sqrt{1-4(3)(6)}}{2(3)}=\frac{-1\pm\sqrt{1-72}}{6}$

$=\frac{-1\pm\sqrt{-71}}{6}=\frac{-1\pm i\sqrt{71}}{6}$

10

$\frac{5}{7}$	7	9	-31	4
		5	10	-15
	7	14	-21	-11

$P(-\frac{5}{7})=-11$

$P(5i)=7(5i)^3+9(5i)^2-31(5i)+4$

$7(125i^3)+9(25i^2)-31(5i)+4$

$875(-i)+225(-1)-155i+4$

$-875i-225-155i+4$

$-221-1030i$

$P(6m)=7(6m)^3+9(6m)^2-31(6m)+4$

$7(216m^3)+9(36m^2)-186m+4$

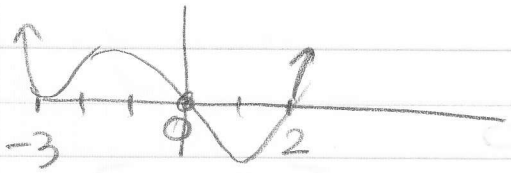
$1512m^3+324m^2-186m+4$

(11)

-2	1	-3	-37	27	252
		-2	10	+54	-162
	1	-5	-27	81	90

$P(-2)\neq 0$

So $x+2$ is not a factor of $P(x)$

12 

degree: $x^{①}(x-2)^{①}(x+3)^{②}$

4 + ↑ dbl root

13 $|5x-4| \geq 19$

$5x-4 \geq 19$ or $5x-4 \leq -19$

$5x \geq 23$ $5x \leq -15$

$x \geq 23/5$ or $x \leq -3$

14 $-10 \leq 2x-7 \leq 10$

$-3 \leq 2x \leq 17$

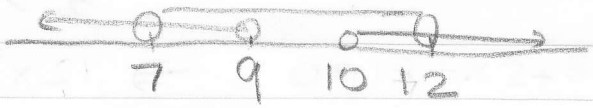
$-3/2 \leq x \leq 17/2$

15 $|2x-19| < 5$ and $|2x-19| \geq 1$

$-5 < 2x-19 < 5$ $2x-19 \geq 1$ or $2x-19 \leq -1$

$14 < 2x < 24$ $2x \geq 20$ $2x \leq 18$

$7 < x < 12$ $x \geq 10$ $x \leq 9$



$7 < x \leq 9$ or $10 \leq x < 12$

16 $\frac{x+1}{x^2-25} \geq 0 \rightarrow \frac{x+1}{(x+5)(x-5)} \geq 0$

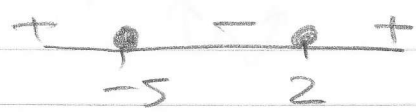
Sign analysis

$x \neq 5$; $x \neq -5$ because denominator $\neq 0$

$(-5, -1]$ or $(5, \infty)$

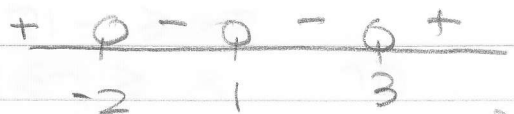
17 $x^2+3x-10 \le 0$

$(x+5)(x-2) \le 0$



$[-5, 2]$

18 $(x+2)(x-1)^2(x-3) < 0$



$(-2, 1)$ or $(1, 3)$

19 $753x^2 - 2490x + 1 = 0$

even exp: sum $= +\frac{2490}{753}$; prod $= \frac{1}{753}$

$12x^3 - 18x^2 + 5x + 81 = 0$

odd exp: sum $= +\frac{18}{12}$; prod $= \ominus\frac{81}{12}$

sum $= +\frac{3}{2}$; prod $= \ominus\frac{27}{4}$

$12x^3 + 5x + 81 = 0 \rightarrow 12x^3 + 0x^2 + 5x + 81 = 0$

odd exp: sum $= \frac{-0}{12} = 0$; prod $= \frac{-81}{12} = -\frac{27}{4}$

$12x^4 + 5x^3 + 6x + 0$

even exp: sum $= -\frac{5}{12}$; prod $= \frac{0}{12} = 0$

20 $x^4 - 3x^3 - 14x^2 + 12x + 40 = 0$

	1	−3	−14	12	40
2		2	−2	−32	−40
	1	−1	−16	−20	0
5		5	20	20	
	1	4	4	0	

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

$\rightarrow$ ROOT $= -2$ (dbl root)

21 $2x^3 - 5x^2 + 22x - 10 = 0$

Possible zeros

$$\frac{\pm 1 \quad \pm 2 \quad \pm 5 \quad \pm 10}{\pm 1 \quad \pm 2}$$

± 1; ± 2; ± 5; ± 10

$\pm \frac{1}{2}$; $\pm \frac{5}{2}$

	2	−5	22	−10
$\frac{1}{2}$		1	−2	10
	2	−4	20	0

$2x^2 - 4x + 20 = 0$

$2(x^2 - 2x + 10) = 0$

Quadratic formula:

$$x = \frac{2 \pm \sqrt{4 - 4(1)(10)}}{2}$$

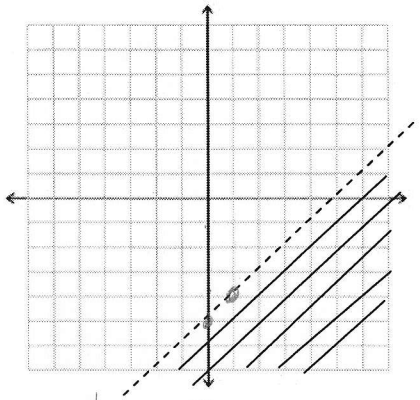
$$= \frac{2 \pm \sqrt{-36}}{2} = \frac{2 \pm 6i}{2}$$

$1 \pm 3i$

20. Find the remaining roots if 2 and 5 are roots of $x^4 - 3x^3 - 14x^2 + 12x + 40 = 0$

21. Solve $2x^3 - 5x^2 + 22x - 10 = 0$. List all the possible rational zeros and use synthetic division.

22. Write an inequality that defines the shaded region.



$b = -5$

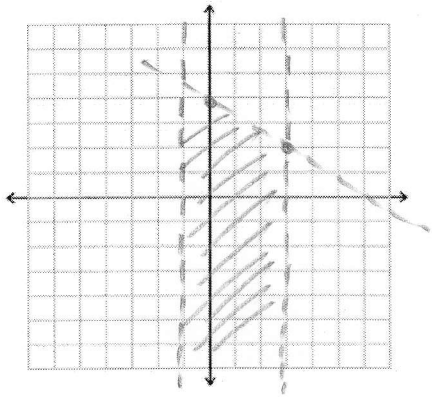
$m = 1$

$y < x - 5$

23. Graph the solution to the system

$2x + 3y < 12 \rightarrow y < -\frac{2}{3}x + 4$

$-1 < x < 3$

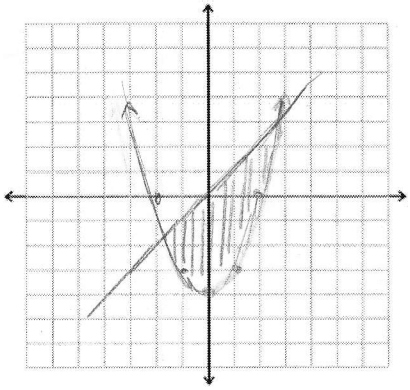


24. Graph the solution to the system:

$y \geq x^2 - 4$

$y \leq x$

x	y
0	-4
1	-3
2	0



Earthquake victims in Haiti need medical supplies and bottled water. Each medical kit measures 1 cubic foot and weighs 10 pounds. Each container of water is also 1 cubic foot but weighs 20 pounds. The plane can carry 80,000 pounds with a total volume of 6,000 cubic feet. It is estimated that each medical kit will aid 4 people, while each container of water will aid 10 people.

25. State the objective function using x for medical kits and y for containers. $x \geq 0;\ y \geq 0$

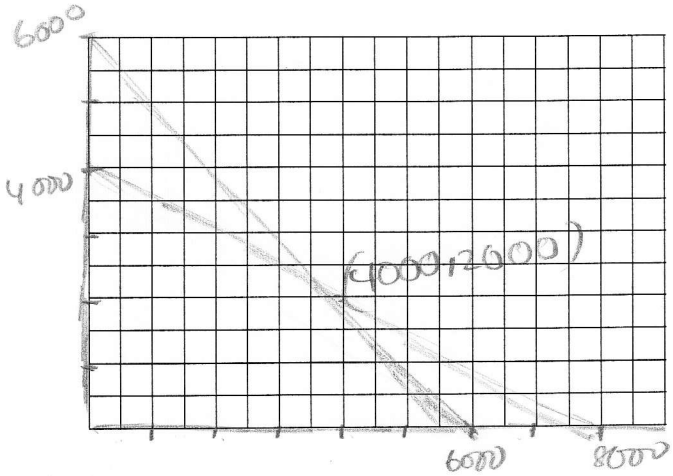
$C = 4x + 10y$

26. x and y are both positive. List the other constraints.

$x + y \leq 6000$

$10x + 20y \leq 80000$

27. Sketch the feasible region below, list all the vertices and find the point that will aid the maximum number of people. State the point in the answer column.



$-10(x + y = 6000)$

$10x + 20y = 80000$

$-10x - 10y = -60{,}000$

$10y = 20{,}000$

$y = 2000$

$x = 4000$

$0, 0 \rightarrow 0$

$0, 4000 \rightarrow 40{,}000$

$4000, 2000 \rightarrow 36{,}000$

$6000, 0 \rightarrow 24{,}000$

Max = 40,000 at (0, 4000)

By getting 4000 cubic ft water → helps 40,000 people