I

$(-20)^2-4(1)(25)=300$ 2 real roots

1. $x^2-20x+25=0$

$x=\frac{20\pm\sqrt{(-20)^2-4(1)(25)}}{2}$

$x=\frac{20\pm\sqrt{300}}{2}$

$x=\frac{20\pm10\sqrt{3}}{2}$

$\boxed{x=10\pm5\sqrt{3}}$

$(-24)^2-4(16)(9)=0$ 1 real root

2. $16x^2+9=24x$

$16x^2-24x+9=0$

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

$\boxed{x=\frac{3}{4}}$

multiplicity of 2

$(2)^2-4(1)(7)=-24$ 0 real roots

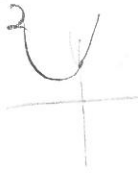
3. $x^2+2x+7=0$

$x=\frac{-2\pm\sqrt{(2)^2-4(1)(7)}}{2}$

$x=\frac{-2\pm\sqrt{-24}}{2}$

$x=\frac{-2\pm2i\sqrt{6}}{2}$

$\boxed{x=-1\pm i\sqrt{6}}$



$(5)^2-4(1)(11)=-19$ 0 real roots

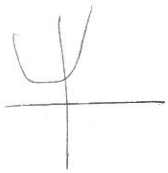
4. $x^2+5x=-11$

$x^2+5x+11=0$

$x=\frac{-5\pm\sqrt{(5)^2-4(1)(11)}}{2}$

$x=\frac{-5\pm\sqrt{-19}}{2}$

$\boxed{x=\frac{-5\pm i\sqrt{19}}{2}}$



$(-3)^2-4(1)(10)=-31$ 0 real roots

5. $x^2=3x-10$

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

$x=\frac{3\pm\sqrt{(-3)^2-4(1)(10)}}{2}$

$x=\frac{3\pm\sqrt{-31}}{2}$

$\boxed{x=\frac{3\pm i\sqrt{31}}{2}}$

$(12)^2-4(6)(14)=-136$ 0 real roots

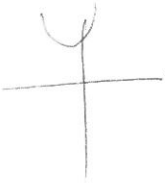
6. $6x^2+12x+14=0$

$x=\frac{-12\pm\sqrt{(12)^2-4(6)(14)}}{12}$

$x=\frac{-12\pm\sqrt{-136}}{12}$

$x=\frac{-12\pm2i\sqrt{34}}{12}$

$\boxed{x=\frac{-6\pm i\sqrt{34}}{6}}$



$(-17)^2-4(2)(33)=25$ 2 real roots

7. $2x^2+33=17x$

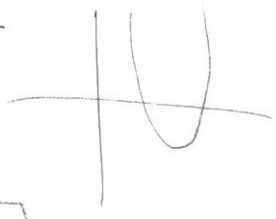
$2x^2-17x+33=0$

$x=\frac{17\pm\sqrt{(-17)^2-4(2)(33)}}{4}$

$x=\frac{17\pm\sqrt{25}}{4}$

$x=\frac{17\pm5}{4}$

$\boxed{x=5.5,3}$



$(6)^2-4(6)(5)=-56$ 0 real roots

8. $6x+5=-6x^2$

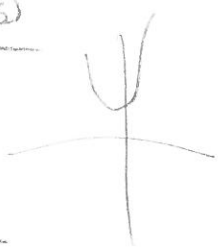
$6x^2+6x+5=0$

$x=\frac{-6\pm\sqrt{(6)^2-4(6)(5)}}{12}$

$x=\frac{-6\pm\sqrt{-56}}{12}$

$x=\frac{-6\pm2i\sqrt{14}}{12}$

$\boxed{x=\frac{-1\pm i\sqrt{14}}{6}}$



II.

9. $\sqrt{-9}$ = $\boxed{3i}$

10. $\sqrt{-81}$ = $\boxed{9i}$

11. $\sqrt{-20}$ = $\boxed{2i\sqrt{5}}$

12. $\sqrt{-48}$ = $\boxed{4i\sqrt{3}}$

13. $\sqrt{-225}$ = $\boxed{15i}$

14. $4i(6+7i)$ = $\boxed{-28+24i}$

15. $10i(12+3i)$ = $\boxed{-30+120i}$

16. $(10+4i)+(5+6i)$ = $\boxed{15+10i}$

17. $(5-15i)-(3+4i)$ = $\boxed{2-19i}$

18. $(-8-8i)(8+8i)$ = $\boxed{128}$

19. $\left(\frac{6}{2+i}\right)\left(\frac{2-i}{2-i}\right)$ = $\boxed{\frac{12-6i}{5}}$

20. $\left(\frac{12i+2}{4+2i}\right)\left(\frac{4-2i}{4-2i}\right)$

$\frac{48i+24+8-4i}{16+4}$ =

$\frac{32+44i}{20}$ =

$\boxed{\frac{8+11i}{5}}$

21. $\left(\frac{3+5i}{3-5i}\right)\left(\frac{3+5i}{3+5i}\right)$

$\frac{9+15i+15i-25}{9+25}$

$\frac{-16+30i}{34}$

$\boxed{\frac{-8+15i}{17}}$

22. $22i(2i^5-8i^{10})$

$44i^6-176i^{11}$ =

$\boxed{-44+176i}$

23. $(2-i\sqrt{3})^2$

$4-4i\sqrt{3}-3$

$\boxed{1-4i\sqrt{3}}$

24. i^{123} =

i^3 =

$\boxed{-i}$

25. i^{32} = $\boxed{1}$

26. $(9-2i)^2$

$81-36i-4$

$\boxed{77-36i}$

III.

27. $0 = x^2 - 2x + 10$

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

$x = \frac{2 \pm \sqrt{-36}}{2}$

$x = \frac{2 \pm 6i}{2}$

$x = 1 \pm 3i$

$0 = (x - (1+3i))(x - (1-3i))$

$0 = (x - 1 - 3i)(x - 1 + 3i)$

28. $0 = 2x^2 + x + 1$

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

$x = \frac{-1 \pm \sqrt{-7}}{4}$

$x = \frac{-1 \pm i\sqrt{7}}{4}$

$x = -\frac{1}{4} \pm \frac{i\sqrt{7}}{4}$

$0 = \left(x - \left(-\frac{1}{4} + \frac{i\sqrt{7}}{4}\right)\right)\left(x - \left(-\frac{1}{4} - \frac{i\sqrt{7}}{4}\right)\right)$

$0 = 2\left(x + \frac{1}{4} - \frac{i\sqrt{7}}{4}\right)\left(x + \frac{1}{4} + \frac{i\sqrt{7}}{4}\right)$

29. $0 = 4x^2 - 3x + 2$

$x = \frac{3 \pm \sqrt{(-3)^2 - 4(4)(2)}}{2(4)}$

$x = \frac{3 \pm \sqrt{-23}}{8}$

$x = \frac{3 \pm i\sqrt{23}}{8}$

$x = \frac{3}{8} \pm \frac{i\sqrt{23}}{8}$

$0 = \left(x - \left(\frac{3}{8} + \frac{i\sqrt{23}}{8}\right)\right)\left(x - \left(\frac{3}{8} - \frac{i\sqrt{23}}{8}\right)\right)$

$0 = 4\left(x - \frac{3}{8} - \frac{i\sqrt{23}}{8}\right)\left(x - \frac{3}{8} + \frac{i\sqrt{23}}{8}\right)$

IV. Vertical!

30. $F(0,2)$

$D: y = -3$

$V(0, -\frac{1}{2})$ or $(0, -.5)$

$p = 2.5$ or $\frac{5}{2}$

$4p(y-k) = (x-h)^2$

$4(\frac{5}{2})(y+\frac{1}{2}) = (x)^2$

$\boxed{10(y+\frac{1}{2}) = x^2}$

Vertical

31. $F(0,1)$

$y = -1$

$V(0,0)$

$p = 1$

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

$\boxed{4(y-0) = x^2}$

32. $F(2,0)$ Horizontal

$D: x = 4$

$V(3,0)$

$p = 1$

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

$\boxed{4(x-3) = y^2}$

33. $F(3,0)$ Horizontal

$D: x = -2$

$V(\frac{1}{2}, 0)$

$p = \frac{5}{2}$ or 2.5

$4(\frac{5}{2})(x-\frac{1}{2}) = (y-0)^2$

$\boxed{10(x-\frac{1}{2}) = y^2}$

V.

Horizontal

34. $y^2 = 16x$

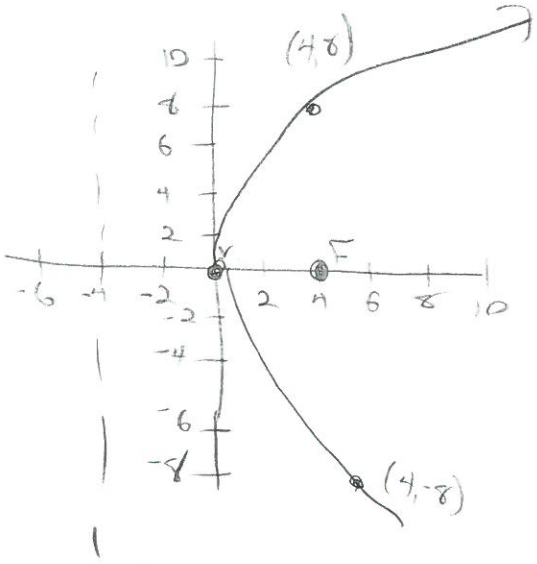
$4p = 16$

$p = 4$

V (0,0)

F (4,0)

D: $x = -4$



Vertical

35. $-4(y+1) = (x-3)^2$

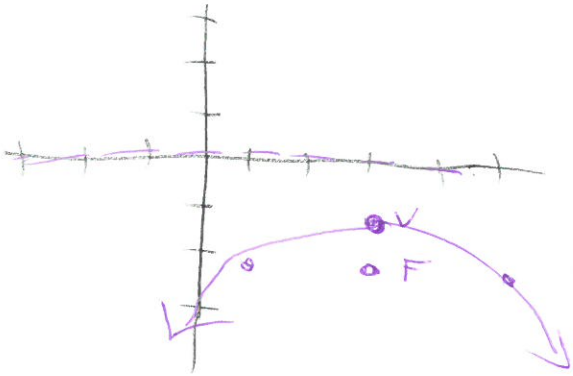
$-4 = 4p$

$-1 = p$

V (3,-1)

F (3,-2)

D: $y = 0$



36. $x^2 - 6x + 6y = -16$

Vertical

$x^2 - 6x + 16 = -6y - 16 + 16$

$(x-4)^2 = -6y$

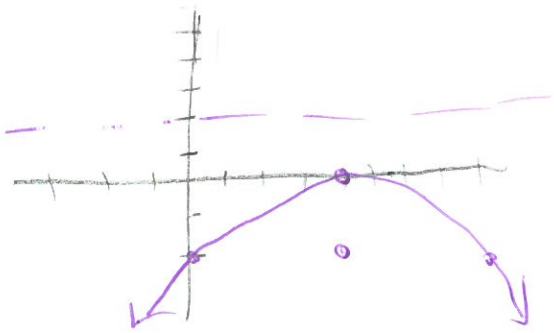
V (4,0)

F (4,-2)

D: $y = 2$

$-6 = 4p$

$-2 = p$



37. $y^2 - 12x + 2y = -37$

Horizontal

$y^2 + 2y + 1 = 12x - 37 + 1$

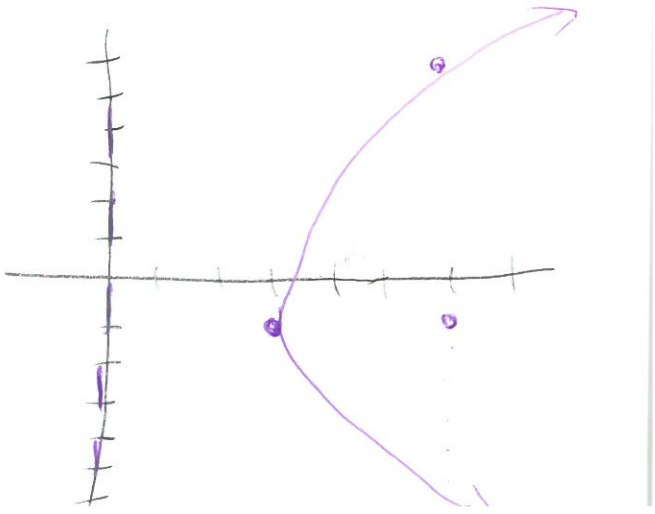
$(y+1)^2 = 12x - 36$

$4p = 12$

$p = 3$

$(y+1)^2 = 12(x-3)$

V (3,-1) F (6,-1) D: $x = 0$



VI

36. $i^{19} = i^3 = -i$

$-i$, ~~$-i^3$~~, i^7, i^{27}, ~~$-i^{19}$~~, $-i^{21}$

$-i^3 = -1(-i) = i$

$i^7 = i^3 = -i$

$i^{27} = i^3 = -i$

$-i^{19} = -(i^3) = -(-i) = i$

$-i^{21} = -1(i^1) = -i$

39. $i^8 - i^2$

$1 - 1 = 2$

$i^7 - i^5$

$i^3 - i$

$-i - i$

$-2i$

$i^6 - i$

$-1 - i$

$4i^4 - 2i^3$

$4 - 2(-i)$

$4 + 2i$

$6i^4 - 2i^2$

$6 - 2(-1) =$

8

a) $i^6 - i^2$, $6i^4 - 2i^2$

b) $i^7 - i^5$

40. a) $(4-3i) + (1+2i) = 5 - i$

b) $(4-3i) - (1+2i) = 3 - 5i$

c) $(4-3i)(1+2i) = 4 + 8i - 3i - 6i^2 = 10 + 5i$

None of these operations produce a real number.

41. $(4-2i)(4+2i) = 2(2-i) \cdot 2(2+i) = 4(2-i)(2+i) =$

$16 - 4i^2$ $\qquad 4(4 - i^2) = 4(5) = 20$

$16 + 8i - 8i - 4i^2 = 20$

$4(2-i)(2+i)$ $\qquad 20$ $\qquad 4(4+2i) - 4i(2+i)$

42. If a graph of a quadratic function never intersects the x-axis, there are 2 complex solutions. So the statement is false.

43. Part A

1. $y = 2x^2 - 6x + 6$
$y + 2 = -\frac{1}{2}x$
Graph b

2. $y + 3x = 2$
$y = 3x^2 + x - 2$
Graph C

3. $y = 3x + 3$
$y = 4x^2 + 2x + 3$
Graph a

Part B

1. $y = -\frac{1}{2}x - 2$

$-\frac{1}{2}x - 2 = 2x^2 - 6x + 6$

$0 = 2x^2 - \frac{15}{2}x + 8$

$x = \frac{\frac{15}{2} \pm \sqrt{\left(-\frac{15}{2}\right)^2 - 4(2)(8)}}{2(2)}$

$x = \frac{\frac{15}{2} \pm \sqrt{-7.75}}{4}$

$x = \frac{\frac{15}{2} \pm \sqrt{-\frac{31}{4}}}{4}$

$x = \frac{\frac{15}{2} \pm \frac{i\sqrt{31}}{2}}{4}$

$x = \frac{15}{8} \pm \frac{i\sqrt{31}}{8}$

$y = -\frac{1}{2}\left(\frac{15}{8} \pm \frac{i\sqrt{31}}{8}\right) - 2$

$y = -\frac{15}{16} \pm \frac{i\sqrt{31}}{16} - 2$

$y = \frac{-47}{16} \pm \frac{i\sqrt{31}}{16}$

$\left(\frac{15}{8} + \frac{i\sqrt{31}}{8}, \frac{-47}{16} - \frac{i\sqrt{31}}{16}\right)$
$\left(\frac{15}{8} - \frac{i\sqrt{31}}{8}, \frac{-47}{16} + \frac{i\sqrt{31}}{16}\right)$

2. $y = 2 - 3x$

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

$0 = 3x^2 + 4x - 4$

$x = \frac{-4 \pm \sqrt{16 - 4(3)(-4)}}{6}$

$x = \frac{-4 \pm \sqrt{64}}{6}$

$x = \frac{-4 \pm 8}{6}$

$x = -2, \frac{2}{3}$

$y = 2 - 3(-2)$

$y = 2 + 6 = 8$

$y = 2 - 3\left(\frac{2}{3}\right) = -1$

$(-2, 8)$
$\left(\frac{2}{3}, -1\right)$

3. $3x + 3 = 4x^2 + 2x + 3$

$0 = 4x^2 - x$

$0 = x(4x - 1)$

$x = 0 \quad x = \frac{1}{4}$

$y = 3(0) + 3 = 3$

$y = 3\left(\frac{1}{4}\right) + 3 = \frac{15}{4}$

$(0, 3)$
$\left(\frac{1}{4}, \frac{15}{4}\right)$

4B. $y = x^2 - x - 6$ $\quad 2y = 3x$

$y = \frac{3}{2}x$

$\frac{3}{2}x = x^2 - x - 6$

$3x = 2x^2 - 2x - 12$

$0 = 2x^2 - 5x - 12$

$(2x + 3)(x - 4) = 0$

$x = \frac{-3}{2} \quad x = 4$

$y = \frac{3}{2}(x)$ $\quad y = \frac{3}{2}(4) = 6$

$y = \frac{3}{2}\left(\frac{-3}{2}\right) = \frac{-9}{4}$

$\left(\frac{-3}{2}, \frac{-9}{4}\right) \quad (4, 6)$

4H. a) $y = 6x^2 + 11x + 4$ has a solution at $(-2, 6)$ with

$\times\ y = -x + 2$ $\quad 6 = -(-2) + 2$

$6 \neq 4$

$\checkmark\ y = -3x$ $\quad 6 = -3(-2)$ ✓

$\checkmark\ y = 5x + 16$ $\quad 6 = 5(-2) + 16$ ✓

b) $y = 6x^2 + 11x + 4$

$y = -3x$

$\left(-\frac{1}{3}, 1\right)$

$-3x = 6x^2 + 11x + 4$

$0 = 6x^2 + 14x + 4$

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

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

$x = -\frac{1}{3} \quad x = -2$

$y = -3\left(-\frac{1}{3}\right) = 1$

$y = 6x^2 + 11x + 4$

$y = 5x + 16$

$(1, 21)$

$5x + 16 = 6x^2 + 11x + 4$

$0 = 6x^2 + 6x - 12$

$0 = x^2 + x - 2$

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

$x = -2 \quad x = 1$

$y = 5(1) + 16 = 21$

HP LaserJet P2055dn

Network Summary

--------- General Information ----------

Status:	I/O Card Ready
Model Number:	J8017E
Hardware Address:	082E5FBD015E
Firmware Version:	V.37.12.IR6508
Port Config:	100TX FULL
Auto Negotiation:	On
Manufacturing ID:	********01****
Date Manufactured:	XX/XXXX

---------- Security Settings ----------

802.1X:	Not Specified
Firewall:	Disabled
Admin Password:	Not Specified
Secure Web:	HTTPS Optional
Cert Expires:	2007-01-01 00:00 UTC
SNMP Versions:	1;2
SNMP Set Cmty Name:	Not Specified
SNMP Get Cmty Name:	Not Specified
Access List:	Not Specified

---------- Network Statistics ----------

Total Packets Received:	148209082
Unicast Packets Received:	2936622
Bad Packets Received:	0
Framing Errors Received:	0
Total Packets Transmitted:	457279
Unsendable Packets:	0
Transmit Collisions:	0
Transmit Late Collisions:	0

---------- TCP/IP ----------

IPv4:	Enabled
IPv6:	Enabled
Host Name:	MHHMTHOPRHP001
IPv4 Domain Name:	inst.hcpss.org
IPv6 Domain Name:	Not Specified
Primary DNS Server:	150.150.212.25
Secondary DNS Server:	10.151.1.10

DNS(IPv6):
Not Specified

WINS Server:	Not Specified
Idle Timeout:	270 sec

---------- IPv4 ----------

Status:	Ready
IP Address:	10.151.36.228
Subnet Mask:	255.255.128.0
Default Gateway:	10.151.0.1
Config By:	Manual
BOOTP/DHCP Server:	Not Specified
TFTP Server:	Not Specified

Bonjour Service Name:
HP LaserJet P2055dn [BD015E]

---------- IPv6 ----------

Status: Ready

Link-Local:
fe80::a2e:5fff:febd:15e
Stateless:
Not Configured

DHCPv6:
Not Configured
Manual:
Not Configured