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For problem VII A on Midterm review sheet:

> $with(Groebner)$:

> $BA := Basis([x^2 - 2\cdot y\cdot z, x - y^2 - 2, z - x\cdot y], plex(x, y, z))$;

$$BA := [z^3 - 32\,z,\ 4\,y\,z - z^2,\ 8\,y^2 - z^2 + 16,\ -z^2 + 8\,x] \quad (1)$$

> $NormalForm(x^3 + y^3 + z^3 - 2\,z^2 + 2\cdot y - 33\cdot z,\ BA,\ plex(x, y, z))$;

$$0 \quad (2)$$

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For problems VII B and C on Midterm review sheet:

> $BB := Basis([x^2 + y^3 + z^3 - 1, x - y^2 + z - 1, x^2 - y^2 - z + 1], plex(x, y, z))$;

$$BB := [z^{10} + 2\,z^9 + 11\,z^8 + 8\,z^7 + 20\,z^6 - 25\,z^5 - 3\,z^4 - 58\,z^3 + 52\,z^2 - 40\,z + 32,\ -83\,z^9 - 128\,z^8 - 809\,z^7 - 566\,z^6 - 1416\,z^5 + 635\,z^4 + 1411\,z^3 + 2512\,y\,z + 2912\,z^2 - 2512\,y + 540\,z - 2496,\ y^3 + z^3 + y^2 + z - 2,\ -y^2 + x + z - 1] \quad (3)$$

> **for** i **to** $nops(BB)$ **do** $BB[i]$ **end do**;

$$z^{10} + 2\,z^9 + 11\,z^8 + 8\,z^7 + 20\,z^6 - 25\,z^5 - 3\,z^4 - 58\,z^3 + 52\,z^2 - 40\,z + 32$$

$$-83\,z^9 - 128\,z^8 - 809\,z^7 - 566\,z^6 - 1416\,z^5 + 635\,z^4 + 1411\,z^3 + 2512\,y\,z + 2912\,z^2 - 2512\,y + 540\,z - 2496$$

$$y^3 + z^3 + y^2 + z - 2$$

$$-y^2 + x + z - 1 \quad (4)$$

> $factor(BB[1])$;

$$(z-1)\,(z^9 + 3\,z^8 + 14\,z^7 + 22\,z^6 + 42\,z^5 + 17\,z^4 + 14\,z^3 - 44\,z^2 + 8\,z - 32) \quad (5)$$

> $collect(BB[2], y)$;

$$(2512\,z - 2512)\,y - 83\,z^9 - 128\,z^8 - 809\,z^7 - 566\,z^6 - 1416\,z^5 + 635\,z^4 + 1411\,z^3 + 2912\,z^2 + 540\,z - 2496 \quad (6)$$

> $factor(BB[2])$;

$$(z-1)\,(-83\,z^8 - 211\,z^7 - 1020\,z^6 - 1586\,z^5 - 3002\,z^4 - 2367\,z^3 - 956\,z^2 + 2512\,y + 1956\,z + 2496) \quad (7)$$

> $BB[3]$;

$$y^3 + z^3 + y^2 + z - 2 \quad (8)$$

> $BB[4]$;

$$-y^2 + x + z - 1 \quad (9)$$

> $fsolve(BB[1], z, complex)$;

$$-1.11194873768170 - 1.18550014787317\,I,\ -1.11194873768170 + 1.18550014787317\,I,\ -0.501775886607404 - 1.78835410228050\,I,\ -0.501775886607404 + 1.78835410228050\,I,\ -0.441018760972384 \quad (10)$$

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> -2.52690155393694 I, -0.441018760972384 + 2.52690155393694 I,
  0.115124189048988 - 0.770478927916720 I, 0.115124189048988
  + 0.770478927916720 I, 0.879238392425002, 1.00000000000000
>
```