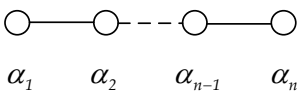
ภาคผนวก (ก)

รากมูลฐานและแผนภาพดินกิน

แผนภาพรากมูลฐานในเวกเตอร์ฐานหลักออร์ธอนอร์มัลและผลรวมของรากมูลฐานในแต่ละกลุ่มของพีชคณิตของลี [6,7,8]

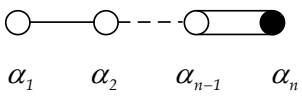
กลุ่ม A_n



$$\alpha_1 = e_1 - e_2$$
$$\alpha_2 = e_2 - e_3$$
$$\vdots$$
$$\alpha_{n-1} = e_{n-1} - e_n$$
$$\alpha_n = e_n - e_{n+1}$$

$$\sum : \left\{ e_p - e_q \right\}_1^{n+1}$$

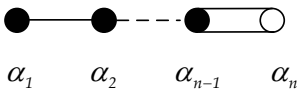
กลุ่ม B_n



$$\alpha_1 = e_1 - e_2$$
$$\alpha_2 = e_2 - e_3$$
$$\vdots$$
$$\alpha_{n-1} = e_{n-1} - e_n$$
$$\alpha_n = e_n$$

$$\sum : \left\{ e_p, \pm e_p \pm e_q \right\}_1^{n}$$

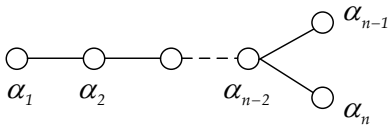
กลุ่ม C_n



$$\alpha_1 = e_1 - e_2$$
$$\alpha_2 = e_2 - e_3$$
$$\vdots$$
$$\alpha_{n-1} = e_{n-1} - e_n$$
$$\alpha_n = 2e_n$$

$$\sum : \left\{ \pm 2e_p, \pm e_p \pm e_q \right\}_1^{n}$$

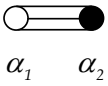
กลุ่ม D_n



$$\alpha_1 = e_1 - e_2$$
$$\alpha_2 = e_2 - e_3$$
$$\vdots$$
$$\alpha_{n-2} = e_{n-2} - e_{n-1}$$
$$\alpha_{n-1} = e_{n-1} - e_n$$
$$\alpha_n = e_{n-1} - e_n$$

$$\sum : \left\{ \pm e_p \pm e_q \right\}_1^{n} \quad (p \neq q)$$

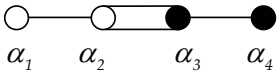
กลุ่ม G_2



$$\alpha_1 = e_1 - e_2$$
$$\alpha_2 = e_2$$

$$\sum : \left\{ \pm e_p, e_p - e_q \right\}_1^3$$

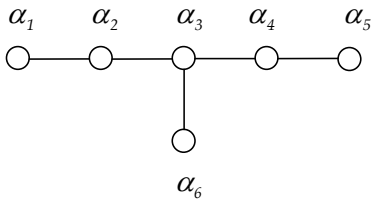
กลุ่ม F_4



$$\alpha_1 = e_2 - e_3$$
$$\alpha_2 = e_3 - e_4$$
$$\alpha_3 = e_4$$
$$\alpha_4 = \tfrac{1}{2}(e_1 - e_2 - e_3 - e_4)$$

$$\sum : \left\{ \pm e_p, e_p \pm e_q, \frac{1}{2}(\pm e_1 \pm e_2 \pm e_3 \pm e_4) \right\}_1^4$$

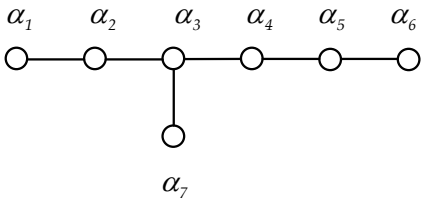
กลุ่ม E_6



$$\alpha_1 = e_1 - e_2$$
$$\alpha_2 = e_2 - e_3$$
$$\alpha_3 = e_3 - e_4$$
$$\alpha_4 = e_4 - e_5$$
$$\alpha_5 = e_5 - e_6$$
$$\alpha_6 = e_3 + e_4 + e_5 + e_6$$

$$\sum : \left\{ e_p - e_q, \pm 2e, e_p + e_q + e_r \pm e \right\}_1^6$$

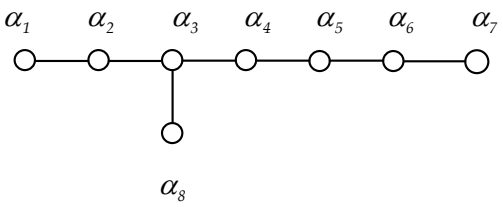
กลุ่ม E_7



$$\alpha_1 = e_1 - e_2$$
$$\alpha_2 = e_2 - e_3$$
$$\alpha_3 = e_3 - e_4$$
$$\alpha_4 = e_4 - e_5$$
$$\alpha_5 = e_5 - e_6$$
$$\alpha_6 = e_6 - e_7$$
$$\alpha_7 = e_4 + e_5 + e_6 + e_7$$

$$\sum : \left\{ e_p - e_q, e_p + e_q + e_r + e_s \right\}_1^8$$

กลุ่ม E_8



$$\alpha_1 = e_1 - e_2$$
$$\alpha_2 = e_2 - e_3$$
$$\alpha_3 = e_3 - e_4$$
$$\alpha_4 = e_4 - e_5$$
$$\alpha_5 = e_5 - e_6$$
$$\alpha_6 = e_6 - e_7$$
$$\alpha_7 = e_7 - e_8$$
$$\alpha_8 = e_6 + e_7 + e_8$$

$$\sum : \left\{ e_p - e_q, \pm(e_p + e_q + e_r) \right\}_1^9$$