

MATH 8174. HOMEWORK 5
Due Friday, October 30

Note: [Hum] = Humphreys, [EW] = Erdmann–Wilson

- (1) Read Chapters 10 and 11 of [EW] and Chapter 8 of [Hum].
- (2) Consider our usual Cartan decomposition of the Lie algebra $L = \mathfrak{sl}_n$. Under our usual notation (see the lecture notes of October 16), do the following:

- (a) find the element $t_\alpha \in H$ for all $\alpha \in \Phi$;
- (b) compute

$$(\alpha, \beta), \quad \frac{2(\beta, \alpha)}{(\alpha, \alpha)}, \quad \beta - \frac{2(\beta, \alpha)}{(\alpha, \alpha)}\alpha$$

for all $\alpha, \beta \in \Phi$;

- (c) verify the root system axioms for (E, ϕ) .

- (3) [Hum] 8.6.
- (4) [EW] 10.7.
- (5) [EW] 10.9.
- (6) [EW] 11.1.
- (7) [EW] 11.5.
- (8) [EW] 11.13.