Math 534. Written problems, set 3. Due Tuesday, October 25.

(1) Construct the root systems and Dynkin diagrams for the Lie algebras $\mathfrak{so}_5$ and $\mathfrak{sp}_4$. (The calculation will depend on your choice of the matrix J defining the corresponding Lie algebra – recall that both are defined as $\{X \in \mathfrak{gl}_n \mid X^t J + JX = 0\}$, but the final answer won't). For J, you can use the matrices defined in Humphreys, p.3, or alternatively, anti-diagonal with all 1s on the case of $\mathfrak{so}_5$, and with $1, 1, -1, -1$ in the case of $\mathfrak{sp}_4$, are also a reasonable choice.

(2) Humphreys, Exercise 9.4 on p.46.