Math 534. Written problems, set 3. Due Tuesday, November 4.

(1) Humphreys, Exercise 2 on p.34.
(2) 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 $\{X \in \mathfrak{gl}_n \mid X^tJ + JX = 0\}$, 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 in the case of $\mathfrak{so}_5$, and with 1,1,−1,−1 in the case of $\mathfrak{sp}_4$, are also a reasonable choice.
(3) Humphreys, Exercise 9.4 on p.46.