Reminders: There will be an exam in class on Wed., Oct. 25, on the material covered up through the week before (through Section 4.3 of Artin). Due to fall break, there will be no class on Mon., Oct. 23 and no lab on Tues., Oct. 24. There will be a review session on the evening of Tues., Oct. 24 (usual time and place for the lab), open to everyone in the class.

Read Artin, Chapter 3, section 6; and Chapter 4, sections 1-3.

From Artin, do these problems:
- Section 3.3 (pp.105-106): 1, 4.
- Section 3.4 (pp.106-107): 11.
- Section 3.5 (p.107): 5(a).
- Section 3.6 (pp.107-108): 1, 2.
- Section 4.1 (p.145): 1, 4.
- Section 4.2 (pp.145-146): 1, 2.
- Section 4.3 (pp.146-147): 1, 4.

Also do the following problems:

1. Let \( V \) be the set of solutions to the differential equation \( f'(x) = f(x) \), and let \( W \) be the set of solutions to the differential equation \( f''(x) = f(x) \).
   a) Show that \( V \) and \( W \) are vector spaces, and that \( V \) is a subspace of \( W \).
   b) Find a basis for \( V \).
   c) Extend your basis of \( V \) to a basis of \( W \) (i.e. find a basis of \( W \) containing your basis of \( V \)).

2. Let \( T : V \to V \) be a linear operator on a vector space \( V \).
   a) Show that the kernel of \( T \) is contained in the kernel of \( T^2 = T \circ T \).
   b) Can the two kernels be equal? Can they be unequal?
   c) Show that the image of \( T \) is contained in the kernel of \( T \) if and only if \( T^2 = 0 \).