Math 530: Problem Set 1[1]

Due date: In class on Friday, January 30.
Course Web Page: `http://dunfield.info/530`
Required Text: Daniel A. Marcus, *Number Fields*, Springer Universitext Series, ISBN: 0387902791.

1. Is $\frac{1+2\sqrt{6}}{1-\sqrt{6}}$ an algebraic integer?
2. Consider $K = \mathbb{Q}(\sqrt{d})$ where d is a square-free integer. Show that $\mathcal{O}_K$ has an integral basis $\{1, \sqrt{d}\}$ if $d \equiv 2, 3 \bmod 4$, and $\left\{1, \frac{1+\sqrt{d}}{2}\right\}$ if $d \equiv 1 \bmod 4$.
3. Marcus, Chapter 2, Problem 13.
4. Marcus, Chapter 2, Problem 14.
5. Marcus, Chapter 2, Problem 15.
6. Marcus, Chapter 2, Problem 16.
7. Again, consider $K = \mathbb{Q}(\sqrt{d})$ where d is a square-free integer. Find the discriminant of K.

[1] Corrected version of April 8, 2009, fixing an error in Problem 2.