- **Lemma 7.8**:
  - Consider I for which statement does not hold, with $N(I)$ minimal, then there are $b, b' \notin I$ but $bb' \in I$.
- **Theorem 7.9**:
  - Define $A = \{x \in K : xP \subseteq \mathcal{O}_K\}$, show A is fractional ideal and $R \subseteq A$
  - Show $A \neq \mathcal{O}_K$:
    - Choose $0 \neq \alpha \in P$, choose prime ideals such that $P_1 \cdots P_t \subseteq (\alpha)$ and t is minimal.
    - Choose $\beta \in P_2 \cdots P_t$ and $\beta \notin (\alpha)$, show that $\frac{\beta}{\alpha} \in A - R$.
  - Show that $P \neq AP$, using Theorem 4.6.
  - Use fact that P is maximal to conclude $AP = R$.
- **Lemma 8.4**:
  - Clear when I or J is $\mathcal{O}_K$ so assume both are proper.
  - Sufficient to show for when J is prime (why?)
  - Use that $N(IP) = |R/(IP)| = |R/I| \cdot |I/(IP)|$.
  - Show that $|I/(IP)| = |R/P|$:
    - Show $I/(IP)$ is one-dimensional vector space over R/P:
      - Show $I \neq IP$ and choose $x \in I - (IP)$.
      - Show $(x, IP) = I$ using unique factorisation.