List of required theorems

The page and theorem numbers below refer to my lecture notes from 2004. Theorems proven this year and not in those notes are listed at the bottom. In addition, some theorems have been proven in a different way this time (Theorems 25, 27), so read the instructions carefully.

Each of four questions on the exam asks you to prove one of these results. As a general rule, any other earlier theorem, proposition or lemma which is used in a proof needs to be stated clearly but NEED NOT BE PROVEN.

Of course, you are recommended to be familiar with the course material in its entirety, because the other four exam questions, each of which requires you to solve a 'problem', assume knowledge of the entire course material. If, in solving any of these problems, you use a result in the lecture notes, it suffices to state this result clearly, and it NEED NOT BE PROVEN.

p.13 : Theorem 6.
p.17 : Theorem 8 (also acceptable to prove this via Minkowski's inequality, which may then be assumed without proof).
p.26 : Gauss lemma.
p.28 or p.34 : One or other proof of Gauss reciprocity law. If you choose to learn the first proof, then Gauss lemma may be assumed ; for the latter proof, Theorem 14 may be assumed.
p.32 : Theorem 14.
p.44 : Theorem 17 (you may be asked to prove one of the three parts).
p.55 : Theorem 22.
p.56 : Sats 23.
p.60 : Theorem 25 (this was proven in a different way this year and either proof is acceptable. If you choose this year's proof, then you may assume Minkowski's theorem).
p.65 : Theorem 27 (this was proven in a different way this year, by first proving the Euler product formula for $\zeta(s)$. Either proof is acceptable).
p.73 : Sats 31 (you may assume Dirichlet's Approximation Theorem).
New : Theorem that average value of $\phi(n)/n$ is $6/\pi^2$.
New : Liouville's theorem on Diophantine approximation of algebraic numbers.
New : Hurwitz theorem that every irrational θ has infinitely many rational approximations $|\theta - p/q| < 1/\sqrt{5}q^2$. You don't need to be able to prove

that $\sqrt{5}$ is best-possible. You may also assume the recurrence relations for convergents in this proof.
New : Schur's lemma and theorem (Ramsey's theorem may be assumed).
New : Van der Waerden's Theorem (suffices to be able to prove the cases discussed in class, i.e.: $W(3,2)$, $W(3,3)$ and $W(4,2)$).