Math 402 homework for April 10, 2009

These are problems from chapter 8 of the book by Adkins and Weintraub, edited somewhat.

2: Let $\pi : G \to H$ be a group epimorphism. Show that a representation σ of H is irreducible if and only if the pullback $\pi^*(\sigma)$ is an irreducible representation of G.

3: Let $H < G$ and let σ be a representation of G. Show that if $\sigma|_H$ is an irreducible representation of H then σ is irreducible. Show that the converse is false.

5: Show that the trivial representation τ and the augmentation ideal $\mathcal{R}_0$ are the only irreducible $\mathbb{Q}$-representations of $\mathbb{Z}_p$ for p prime.

6: Find all irreducible and all indecomposable $\mathbb{F}_p$-representations of $\mathbb{Z}_p$ for p prime. (Recall that $\mathbb{F}_p$ denotes $\mathbb{Z}_p$ thought of as a field.)