Always justify your answers, even if the question does not explicitly say so. Write your own solutions, independently of anyone else.

Core Problems:
I. Sec. 4.2 # 2
II. Sec. 4.2 # 9 abc (Assume $f(x) \in \mathbb{Q}[x]$).
III. Sec. 4.2 # 20, 21, 23 ab (Hint: A homomorphism defined on any of the direct products in this problem is completely determined by $\phi(1,0)$ and $\phi(0,1)$—why? Call these something, maybe $(a,b)$ and $(c,d)$. What is the resulting formula for $\phi(x,y)$? Now find conditions on $a,b,c,d$ in order that $\phi$ is a homomorphism.)

Advanced Problems: Due Tue. Dec. 8 (last day of classes). Students registered for 6000 must turn these problems in. They count for extra credit for 4000 students, but anyone hoping to get an ‘A’ in 4000 should do a reasonable number of advanced problems. Please hand in Advanced Problems separately from Core Problems.
IV. Sec. 4.2 # 16 bcd, 23d.