WRITTEN HOMEWORK #5, DUE MAY 14, 2010, UPDATED MAY 12

Unless explicitly noted, you are to justify all of your responses with work and/or proofs. Notice that you have an additional week for this problem set! It is suggested that you take the extra time to start reading references for your final paper project.

(1) Exercise 2.10 from the text.
(2) Exercise 3.1 from the text. For part (b), notice that $12/\pi^2$ is equal to $2/\zeta(2)$, where ζ is the Riemann zeta function. It turns out that $1/\zeta(2)$ is the probability that two randomly selected integers (in a suitable sense) are relatively prime to each other. This appearance of $\zeta(2)$ is not coincidental; think about how this problem and the question of two integers being relatively prime are related. You should give a proof of the fact that two randomly selected integers is $1/\zeta(2)$ in the solution to your problem if you choose to use this method; this is a standard question in number theory.
(3) Exercise 3.2 from the text. Part (b) is now optional and is extra credit that you can turn in at the end of the term. See the related document on hints on how to do this problem.
(4) Exercise 3.4 from the text.