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MATH 512 HOMEWORK 5, SPRING 2020

DUE AT THE BEGINNING OF CLASS ON MONDAY, MARCH 9.

One goal for this course is for you to develop your skill in effectively communicating mathematics. With this in mind, you should clearly write up your solutions. **Solutions with little or no justification will receive little or no credit.**

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- (1) Continue reading through page 140, skipping pages 105-124 if you like.
- (2) Let $\varphi(n)$ denote the number of positive integers less than n that are relatively prime to n .

In class students showed that $\varphi(p^n) = p^{n-1}(p - 1)$.

Let m and n denote positive integers with $(m, n) = 1$. Prove that, in this case,

$$\varphi(mn) = \varphi(m)\varphi(n).$$

It might help to first consider the case where m and n are both prime. The ideas we used in class, as well as ideas from the first section of this course, might help.