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MATH 350

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A Homework Assignment

Problem 1. Prove that there are infinitely many prime numbers.

Proof. Let S be a set of finitely many primes. Let q be one more than the product of all elements of S. Consider that if q is prime, then there must obviously be at least one prime number which is not enumerated in S. On the other hand, if q is not prime, then by the fundamental theorem of algebra there must exist at least one prime factor of q, and this factor is not included in S since q is not divisible by any elements of S. Thus any finite enumeration of primes is necessarily incomplete. ∎

Problem 2. What is the air-speed velocity of an unladen swallow?

Solution. African or European? ∎

Exercise 3. Go outside and find some fossils, because fossils are cool.

Solution.

$$\int_0^{\pi/6} \sec y \, dy = \ln\left(\sqrt{3}\right) \cdot i^{64}$$

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