Name: _____ **Panther ID:** _____

Worksheet - Aug. 31 MAT 3501 Fall 2017

1. Prove Euclid's theorem: There are infinitely many primes.

2. (a) Prove: to check that a given integer N is prime is enough to verify that it is not divisible by primes $\leq \sqrt{N}$. Apply this to check that 2017 is prime.

(b) For each of the following numbers, find their largest prime factors:
(b1) 2015! + 2016!
(b2) 2016! + 2017!
(b3) 2017! + 2018!

3. Given any integer $M \geq 3$ (if you want, you could take $M = 2017$), show that there exist an integer N so that all the consecutive numbers $N+2, N+3, N+4,$ ... $N+M$ are composite. (Thus, this exercise is showing that you can find (finite) sets of consecutive composite numbers of arbitrary length.)