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Math Talk #2
MAT 380
11/05/12

Perfect Numbers

I. Introduction
    a. Important People
        i. The Greeks
        ii. Pythagoras
        iii. Euclid
        iv. Euler
    b. Origins and Present
        i. Since before the Ancient Greeks
        ii. 47 known perfect numbers
        iii. Only even perfect numbers found thus far
        iv. Mathematicians have neither been able to prove or disprove that there is an infinite number or perfect numbers or if there are any odd perfect numbers.

II. Body
    a. Definition
        i. A perfect number is a number that is equal to the sum of its' positive proper divisors.
    b. Vocabulary
        i. *Mersenne Primes*: is a specific type of prime number. It must be reducible to the form $2^n - 1$, where n is a prime number. The first few known values of n that produce Mersenne primes are where $n = 2$, $n = 3$, $n = 5$, $n = 7$, $n = 13$, $n = 17$, $n = 19$, $n = 31$, $n = 61$, and $n = 89$. Examples are where $2^n – 1=$ 3, 7, 31, etc.
        ii. *Proper divisor*: all positive divisors of an integer z that are not z itself.
        iii. $\sigma(n)$=sum of all divisors of n (including 1 and n).
        iv. n is perfect exactly when $\sigma(n)=2n$
    c. Euclid's Perfect Number Formula
        i. If $2^p – 1$ is a prime number then $2^{p-1}(2^p – 1)$ is a perfect number.
    d. Euler's Perfect Number Theorem
        i. If n is an even perfect number, then n looks like $n=2^{p-1}(2^p – 1)$ where $2^p – 1$ is a Mersenne Prime.
    e. Proof of Euler's Perfect Number Theorem

III. Conclusion\

a. Examples of Perfect Numbers.
b. Further explanation of the absence of odd perfect numbers.

IV. References

a. http://en.wikipedia.org/wiki/List_of_perfect_numbers
b. http://en.wikipedia.org/wiki/Mersenne_prime
c. http://en.wikipedia.org/wiki/Perfect_number
d. http://www-history.mcs.st-and.ac.uk/HistTopics/Perfect_numbers.html
e. http://www.scienceiq.com/Facts/PerfectNumbers.cfm
f. A Friendly Introduction to Number Theory, third edition, Joseph H. Silverman