

LA Session - Number Theory 1

1) In general, you were told in class that for all integers a and b and positive integers n , if $a \equiv b \pmod{n}$, then $f(a) \equiv f(b) \pmod{n}$, where f is any polynomial function that operates on integers only. Using the definition of mod only, prove this specifically for the function $f(a) = a^3$.

2) Convert the following values from the bases indicated to base 10:

i) 2165_7

iv) 21302_4

ii) BCF_{16}

v) 101001111101_2

iii) 12345_8

3) Convert the following base 10 values to the bases indicated:

i) 22111 to base 12

iv) 3209 to base 7

ii) 83810 to base 16

v) 4095 to base 8

iii) 907 to base 2

4) Prove or disprove: if n is an integer, then $n(5n+1)$ is an even integer.

5) Prove or disprove: if $n(5n+1)$ is an even integer, then n is an integer.