Math 314 Summer 2011
6/14/2011 Quiz #9

Name: Key

Show all work clearly and in order. Please box your answers. 10 minutes.

1. Show: For every odd integer n, $(-1)^n = -1$.

Proof. Let $n \in \mathbb{Z}$ be odd.
so $\exists k \in \mathbb{Z}$ such that $n = 2k+1$
Observe $(-1)^n = (-1)^{2k+1} = (-1)^{2k}(-1)^1 = ((-1)^2)^k(-1) = (+1)(-1) = -1$.

$\square$

2. Let $n \in \mathbb{Z}$. Show: If n is even, then $4 \mid n^3$.

Proof. Let $n \in \mathbb{Z}$ be even.
So $\exists k \in \mathbb{Z}$ such that $n = 2k$
Notice that $n^3 = (2k)^3 = 2^3k^3 = 8k^3 = 4(2k^3)$
since $2k^3 \in \mathbb{Z}$ we have $4 \mid n^3$

$\square$

3. (a) Write all the divisors of 28:

$-28, -14, -7, -4, -2, -1, 1, 2, 4, 7, 14, 28$

(b) Which of the divisors found in part (a) are prime?

$2, 7$

(c) Which of the divisors found in part (a) are composite?

$4, 14, 28$