**1.** Give a recursive definition of the sequence $\{a_n\}$, $n = 1, 2, 3, \ldots$ if

**a)** $a_n = 6n$.

**b)** $a_n = 2n + 1$.

**c)** $a_n = 10^n$.

**d)** $a_n = 5$.

**2.** Give a recursive definition of

**a)** the set of even integers.

**b)** the set of positive integers congruent to 2 modulo 3.

**c)** the set of positive integers not divisible by 5.

**3.** Let $S$ be the set of positive integers defined by

*Basis step:* $5 \in S$.

*Recursive step:* If $n \in S$, then $3n \in S$ and $n^2 \in S$.

a) Show that if $n \in S$, then $n \equiv 5 \pmod{10}$.
b) Show that there exists an integer $m \equiv 5 \pmod{10}$ that does not belong to $S$.

**4.** Give a recursive algorithm for computing $nx$ whenever $n$ is a positive integer and $x$ is an integer, using just addition.

5. Devise a recursive algorithm for computing the greatest common divisor of two nonnegative integers $a$ and $b$ with $a < b$ using the fact that $\gcd(a, b) = \gcd(a, b - a)$.