Math 314 Summer 2010
6/16/2010 Quiz #12

Name: Key

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

1. Compute the first four terms in each of the following sequences:

   (a) $\forall n \geq 0$, $s_n = 5 - 3n$.

   $S_0 = 5 - 3(0) = 5 - 0 = 5$
   $S_1 = 5 - 3(1) = 5 - 3 = 2$
   $S_2 = 5 - 3(2) = 5 - 6 = -1$
   $S_3 = 5 - 3(3) = 5 - 9 = -4$

   (b) $\forall n \geq 0$, $s_n = 3 \cdot 2^n$.

   $S_0 = 3 \cdot 2^0 = 3 \cdot 1 = 3$
   $S_1 = 3 \cdot 2^1 = 3 \cdot 2 = 6$
   $S_2 = 3 \cdot 2^2 = 3 \cdot 4 = 12$
   $S_3 = 3 \cdot 2^3 = 3 \cdot 8 = 24$

   (c) $s_0 = 1$ and $\forall n \geq 1$, $s_n = 1 + n - s_{n-1}$.

   $S_0 = 1$
   $S_1 = 1 + (1) - (1) = 1$
   $S_2 = 1 + (2) - (1) = 2$
   $S_3 = 1 + (3) - (2) = 2$

2. Find a closed formula for each of the following sequences:

   (a) $4, 6, 8, 10, 12, \ldots$.

   $\boxed{\forall n \geq 0 \;,\; S_n = 4 + 2n}$

   (b) $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{32}, \ldots$.

   $\boxed{\forall n \geq 1 \;,\; S_n = \frac{1}{2^n}}$

   (c) $1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \ldots$.

   $\boxed{\forall n \geq 1 \;,\; S_n = \frac{1}{n}}$

   NOTE: There are an infinite number of correct solutions to these three problems.

3. Compute $\sum_{i=1}^{100}(2i - 1)$

$$= \sum_{i=1}^{100} 2i + \sum_{i=1}^{100}(-1)$$

$$= 2\sum_{i=1}^{100} i + (-1)\sum_{i=1}^{100} 1$$

$$= 2\left[\frac{100(101)}{2}\right] + (-1)(100)$$

$$= \boxed{10000}$$