Mathematics 174

**Quiz # 18** Name: Key

***You must show your work to get full credit.***

**1.** The sequence $a_1, a_2, a_3 \ldots$ is defined by

$$a_n = 2a_{n-1} - a_{n-2} \quad \text{for} \quad n \geq 3$$

and $a_1 = 1$, $a_2 = 4$. Write the first five terms in the sequence.

$a_1 = 1$

$a_2 = 4$

$a_3 = 2(4) - (1) = 7$

$a_4 = 2(7) - (4) = 10$

$a_5 = 2(10) - (7) = 13$

$a_1 =$ 1

$a_2 =$ 4

$a_3 =$ 7

$a_4 =$ 10

$a_5 =$ 13

**2.** Show that $a_n = 1 + 2^n$ is a solution to

$$a_{n+2} = 3a_{n+1} - 2a_n \quad \text{for} \quad n \geq 0$$

and $a_0 = 2$ and $a_1 = 3$

$a_0 = 1 + 2^0 = 1 + 1 = 2$

$a_1 = 1 + 2^1 = 1 + 2 = 3$

$$\begin{aligned} 3a_{n+1} - 2a_n &= 3(1 + 2^{n+1}) - 2(1 + 2^n) \\ &= 3 + 3 \cdot 2^{n+1} - 2 - 2^{n+1} \\ &= 1 + 2 \cdot 2^{n+1} \\ &= 1 + 2^{n+2} \\ &= \underline{\underline{a_{n+2}}} \end{aligned}$$