HW 3

① Let $a_1(n) = 2^{2^n}$. Then $a_1(n-1)^2 = (2^{2^{n-1}})^2 = 2^{2 \cdot 2^{n-1}} = 2^{2^n}$
so $a_1(n-1)^2 = a_1(n)$. Thus a_1 satisfies the recurrence.
Consider $a_2(n) = 3 \cdot 2^{2^n}$,
$$a_2(n-1)^2 = (3 \cdot 2^{2^{n-1}})^2 = 9 \cdot 2^{2 \cdot 2^{n-1}} = 9 \cdot 2^{2^n}$$
But $a_2(n) = 3 \cdot 2^{2^n}$. Since $9 \cdot 2^{2^n} \neq 3 \cdot 2^{2^n}$, $a_2(n)$ does not satisfy the recurrence.

② $a(n) - 3a(n-1) + 2a(n-2) = n$

Gen soln: $z^2 - 3z + 2 = 0 \qquad (z-2)(z-1) = 0 \qquad z = 2, 1$

$a(n) = c_1 2^n + c_2 1^n$

Part s: $a(n) = c_1 n + c_0$

$c_1 n + c_0 - 3(c_1(n-1) + c_0) + 2(c_1(n-2) + c_0) = n$

$\cancel{c_1 n} + \cancel{c_0} - \cancel{3c_1 n} + \cancel{3c_1} - \cancel{3c_0} + \cancel{2c_1 n} - 4c_1 + \cancel{2c_0} = n$

No solution

③ $z^3 - 2z^2 - 2z + 2 = 0$

$$\boxed{a(n) = 0.50167(-1.17)^n + 4.494(.619)^n + 2.481^n - 3}$$