

Honors HW4 MATH 2501 Fall 2018 (20 points)
Recall the definition of Δ : for any function $f(x)$,

$$\Delta f(x) \stackrel{\text{def}}{=} f(x+1) - f(x).$$

Consider the following equation with an unknown function $y(x)$:

$$(*) \quad \Delta y(x) = y(x).$$

1. Expand the left-hand side of $(*)$ using the definition of Δ .
2. Solve the resulting equation from Problem 1 for $y(x+1)$ (*note: you will get a $y(x)$ on the "other side"*).
3. If $y(0)=1$, then use the formula you found in Problem 2 to find $y(1)$, $y(2)$, and $y(3)$. (*note: for example, plug in $x = 0$ to find an equation for $y(1)$ - try it!*)
4. If $y(0)=2$, then use the formula you found in Problem 2 to find $y(1)$, $y(2)$, and $y(3)$.
5. Let $f(t) = 2t$. Compute $\Delta f(t)$. Can you express $\Delta f(t)$ in terms of $f(t)$?