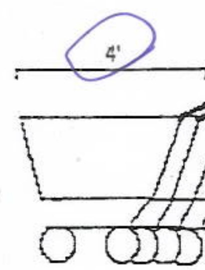
MATH 172 **Fall, 2009** **Quiz #2** **Name:** M^2

1. Give the updating equation (also known as the recurrence equation) for the length $\ell(n)$ of a chain of n grocery buggies, where each buggy is 4 feet long, and when you push a new buggy into the chain, only 6 inches sticks out. Note that the pattern doesn't really begin until you actually have one buggy, so $\ell(0)$ is not defined, $\ell(1) = 4$, $\ell(2) =$ 4.5, $\ell(3) =$ 5. Then find an explicit formula for $\ell(n)$ in terms of n. Suggestion: ~~make a table with a column for n and a column for $\ell(n)$.~~

need same units for both



$$\boxed{\ell(n+1) = \ell(n) + 0.5}$$

chain gets ½ ft longer with each additional cart.

n	$\ell(n)$	
0	—	
1	4	$+0.5$
2	4.5	$+2(0.5)$
3	5.0	$+3(0.5)$
4	5.5	
5	6.0	$+4(0.5)$

Now n carts is one cart (4') plus $n-1$ handle lengths ($(0.5)(n-1)$ feet)

$$\boxed{\begin{aligned}\ell(n) &= 4 + 0.5(n-1)\\ &= 3.5 + 0.5n\end{aligned}}$$

2. If $P(n) = n^2 - 3n$, compute ΔP.

$$\begin{aligned}\Delta P &= P(n+1) - P(n)\\ &= [(n+1)^2 - 3(n+1)] - [n^2 - 3n]\\ &= n^2 + 2n + 1 - 3n - 3 - n^2 + 3n\\ &= 2n - 2\end{aligned}$$