We solve the following problem using Laplace transforms:
\[
x'' = -32H(t - 3), \quad x(0) = 100, \quad x'(0) = 0.
\]
The equation says that it takes three seconds before Wile E. Coyote realizes he is going to fall off a 100 foot cliff and gravity kicks in. First we get the equation for the Laplace transform \( X = \mathcal{L}\{x\} \) of the solution.
\[
s^2X - 100s = -32\frac{e^{-3s}}{s} \Rightarrow s^2X = 100s - 32\frac{e^{-3s}}{s} \Rightarrow X = \frac{100}{s} - 32\frac{e^{-3s}}{s^3}.
\]
Then we find the inverse Laplace transform.
\[
\mathcal{L}^{-1}\{1\} = \frac{1}{s}, \quad \mathcal{L}^{-1}\{\frac{1}{s^2}\} = \frac{t^2}{2}, \quad \mathcal{L}^{-1}\{\frac{e^{-3s}}{s^3}\} = H(t - 3)\frac{(t - 3)^2}{2},
\]
\[
x = \mathcal{L}^{-1}\{X\} = 100 - 16H(t - 3)(t - 3)^2.
\]
Finally for clarity we write out \( x \) in piecewise form:
\[
x = \begin{cases} 
100 & \text{if } 0 \leq t < 3, \\
100 - 16(t - 3)^2 & \text{if } t \geq 3.
\end{cases}
\]
Indeed, falling in the usual fashion commences after three seconds.