## EECS20n, Quiz 3, 3/5/03

Please print your name and lab time here:

Last Name $\qquad$ First $\qquad$ Lab time $\qquad$

A single-input single-output system has the $\left[A, b, c^{T}, d\right]$ representation given by

$$
A=\left[\begin{array}{lll}
0 & 1 & 0 \\
0 & 0 & 1 \\
0 & 0 & 0
\end{array}\right], \quad b=\left[\begin{array}{l}
1 \\
0 \\
0
\end{array}\right], \quad c^{T}=\left[\begin{array}{lll}
1 & 0 & 0
\end{array}\right], \quad d=0 .
$$

1. Calculate $A^{n}, n \geq 0$, by carrying out the matrix multiplications.

$$
A^{0}=[\quad], A=\left[A^{2}=\left[\square, A^{3}=[\square .\right.\right.
$$

2. Recall that the impulse response is given by $h:$ Natural $_{0} \rightarrow$ Reals, in which $h(0)=$ $d, h(n)=c^{T} A^{n-1} b, n \geq 1$. Find the impulse response for the system given above.
3. For the input $x:$ Natural $_{0} \rightarrow$ Reals given by $x(1)=1$ and $x(n)=0, n \neq 1$, find the zero-state response $y:$ Natural $_{0} \rightarrow$ Reals.
