2.6 Problems

1. For each of the following discrete-time systems, determine whether or not the system is (1) linear, (2) causal, (3) stable, and (4) shift-invariant (In the following table, α and β are both nonzero constants and the function $round(x)$ rounds the sample x to the nearest integer):

Part	System	Linear?	Causal?	Time-invariant?	Stable?
(a)	$y[n] = n^3 x[n]$				
(b)	$y[n] = (x[n])^5$				
(c)	$y[n] = \beta + \sum_{\ell=0}^{3} x[n - \ell]$				
(d)	$y[n] = \ln(2 + |x[n]|)$				
(e)	$y[n] = \alpha x[-n + 2]$				
(f)	$y[n] = x[n - 4]$				
(g)	$y[n] = x[n]u[n]$				
(h)	$y[n] = x[n] + nx[n + 1]$				
(i)	$y[n] = x[n] + \frac{1}{2}x[n - 2] - \frac{1}{3}x[n - 3]x[2n]$				
(j)	$y[n] = \sum_{k=-\infty}^{n+5} 2x[k]$				
(k)	$y[n] = x[2n]$				
(l)	$y[n] = round(x[n])$				

Just indicate "Yes" or "No" for each system and property (no proof needed).