Quiz 22

Name: _____

1. Using the stability test, determine the stability of the following differential equation. Use the fact that k is positive. [This is the logistic model.]

$$\frac{dy}{dt} = ky\left(1 - \frac{y}{N}\right).$$

The equilibria are $y^* = 0$ and $y^* = N$. The updating function is $f(y) = ky - \frac{k}{N}y^2$, and $f'(y) = k - \frac{k}{N}y$. Plugging in 0 and N, you get $f'(0) = k$ is positive, and $f'(N) = -k$ is negative. Thus, $y^* = 0$ is an unstable population, and $y^* = N$ is a stable population.