Solution 3(a)

1. The efficiency of gravitational accretion is about 6%, which is an order of magnitude more efficient than nuclear processes. This means that only about 2 solar masses a year are needed to fuel the observed luminosities. Actually, we can expect the efficiency to be even higher than this for rotating black holes. The maximum efficiency of extracting potential energy from a rotating black hole can be shown to be about 40%.

2. The observed variability limits the size of the region and hence the Schwarzschild radius. Variability on the time scale of an hour demands a black hole in the center.