of length related to the cluster's radius, and the velocity dispersion is obtained from Doppler shifts (assuming gravitationally bound). Specifically

$$\sigma \propto \left(\frac{M}{R}\right)^{1/2}$$

(P.S. I am told the virial theorem applies to all gravitationally bound systems. Yes)

To find R we need the angular diameter and the distance to the cluster

3/5 $M \propto R\sigma^2$ 2 3/26

3) a) Using $2R = ct$

where $2R$ is diameter of emitting region (upper limit), t is period of variation.

$2R = ct = 3E8\,m/s \times 20 \times 60\,s$

Do not write like this use 3.6×10^{11} m

$= 3.6E11\,m$

$= \frac{3.6E11\,m}{3.09E16\,m/pc}$

$\simeq 1 \times 10^{-5}$ pc

2 1/2 / 3 $= 1.165\ E-5$ parsec

↑ NOT 4 s.f. !

b) $2R = ct$

$= 3E8\,m/s \times 2 \times 3600\,s$

$= 2.16\ E12m$

or $\frac{2.16\ E12m}{3.09E16m/pc} = 7.0\ E-5\,pc$ 7×10^{-5} pc

3/2

Your must use standard convention in writing answers A 10

c) The infrared emitting region is likely to be larger than the X-ray emitting region. Infrared radiation originates mainly from the dust/gas surrounding the AGN, while the X-rays originate