Name: ....

ASTRONOMY 1102 - Section 1
Instructor: Juhan Frank
Spring 1999
Homework # 9 due Mon. Apr. 26th
Expansion of the Universe: Hubble's Law

1) Hubble's Law is an empirical linear relationship between the radial velocity of recession and the distance of galaxies. Use Figure 34-1 B (bottom right of page 567) to calculate the Hubble constant as determined by Hubble and Humason in 1931. Please show explicitly the steps you follow to calculate it.
Compare with modern values.

Use ANY point on the straight line which represents the best fit to the data gathered by Hubble and Humason. for example I took the value on the line at 20 Mpc which I estimate by eye to be a bit more than 11,000 km/s but not quite 12,000 km/s, so let's say 11,500 km/s. The Hubble constant must be

H_0 = v/d = 11,500 km/s/20 Mpc = 575 km/s/Mpc

about 10 times larger than current estimates.

2) Taking the current best value for H_0 = 65 km/s/Mpc, calculate the *approximate* distance to a galaxy whose redshift is z = 0.043.

z = v/c = 0.043, therefore v = 0.043 x 300,000 km/s = 12,900 km/s.
Since the relationship is approximate, I round up v = 13,000 km/s.
Now we estimate the distance from Hubble's Law as follows:

d = v/H_0 = 13,000km/s / 65 km/s/Mpc = 200 Mpc