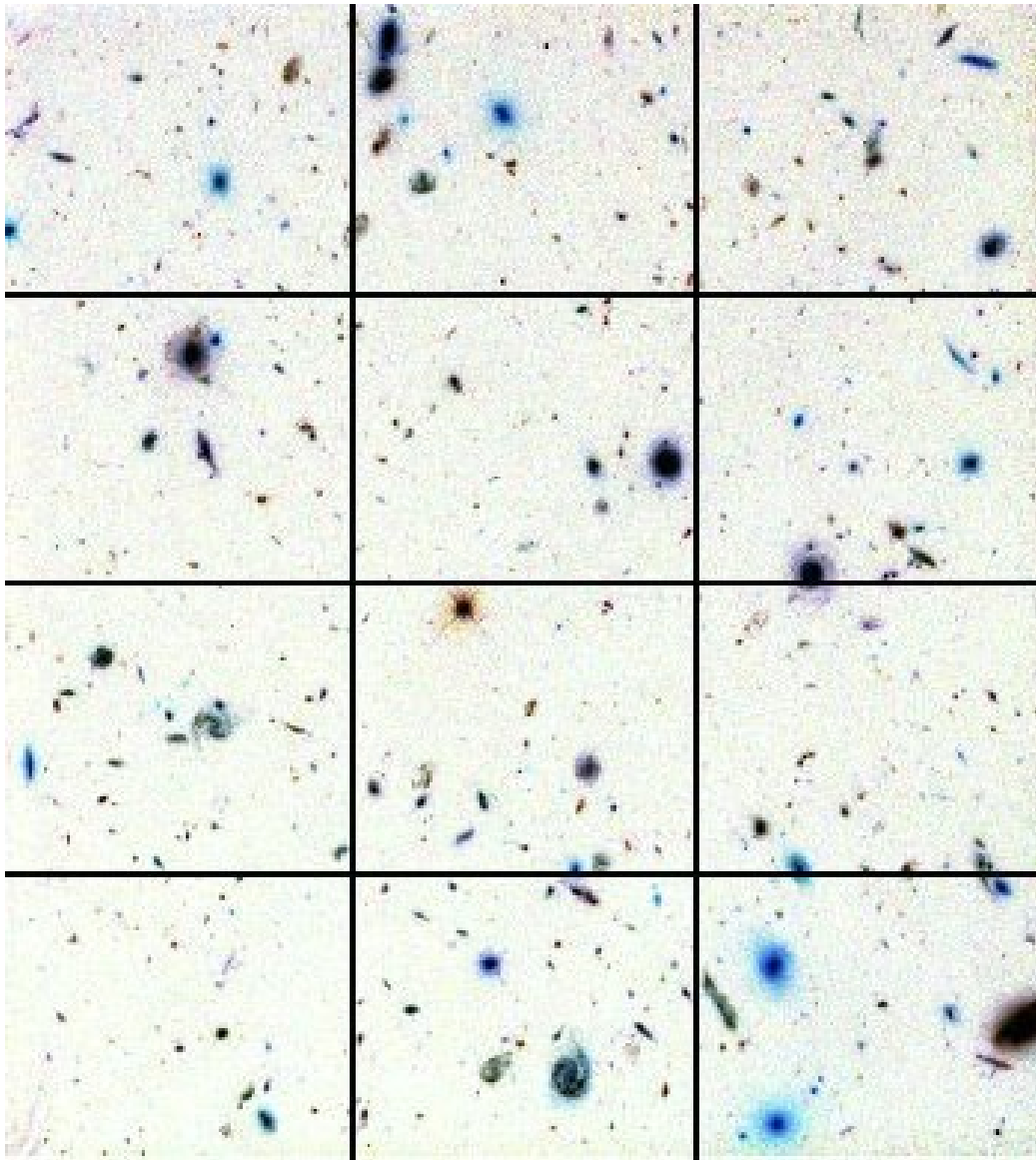


ASTRONOMY - IN-CLASS EXERCISE – The Scale of the Universe

How many galaxies are there in the universe? To estimate this number, we'll count the number of galaxies in a small section of the famous Hubble Deep Field photo, and then multiply by the number of such photos that would cover the whole sky. Below is a close-up of $\frac{1}{3}$ of the Hubble Deep Field photo (in negative). Pick one of the 12 squares, circle that square, and count the number of galaxies in that square. If the Hubble Deep Field photo as a whole represents $\frac{1}{30,000,000}$ of the whole sky, estimate the number of galaxies in the universe. (Hint – your galaxy count for one square of the photo below is $\frac{1}{12}$ of $\frac{1}{3}$ of $\frac{1}{30,000,000}$ of the total number of galaxies in the universe....) Show your calculations below.



2. Can you spot the Supernova in these before and after pictures of the galaxy M51? Circle the supernova.

