Key points from Lecture 8 of ASTR 350

1. Black holes have a "point of no return" called an *event horizon*. Once you fall in, you can't get back out; not even light can escape.
2. But at the event horizon, if you fell freely, you would not necessarily be torn apart. In fact, the tidal force (which is what would rip you apart; the effect is called *spaghettification*) scales like $1/M^2$ for a black hole of mass M; you wouldn't even notice the force if you fell freely through the event horizon of a supermassive black hole!
3. Inside the black hole is, however, a *singularity*, at which the density, gravitational force, and tidal force are infinite (in the prediction of general relativity). There, you're doomed!
4. Seen from the outside, someone falling toward a black hole would appear to go faster and faster, but as they approached the event horizon they would appear to slow down, fade, and become redder. You would never see anything fall through the event horizon.
5. Seen from the point of view of a freely-falling observer, however, you'd pass right through the event horizon with no fuss (until you got ripped apart, of course!).
6. Near a black hole, spacetime is strongly distorted. Light can be bent very dramatically around a black hole, so much so that you could see light emitted from behind the hole!