

$$dp/dr = -\frac{GM(r)}{r^2}\rho(r)$$

$$\rho(r) = \rho = \text{const.}, \quad M(r) = \frac{4\pi}{3}\rho r^3, \quad M = M(R) = \frac{4\pi}{3}\rho R^3$$

$$\Rightarrow \quad dp/dr = -\frac{4\pi}{3}G\rho^2 r$$

$$\Leftrightarrow \quad \int_r^R \frac{dp}{dr'} dr' = -\frac{4\pi}{3}G\rho^2 \int_r^R r' dr'$$

$$\Leftrightarrow \quad \underbrace{p(R)}_0 - p(r) = -\frac{4\pi}{6}G\rho^2(R^2 - r^2)$$

$$\Leftrightarrow \quad p(r) = \frac{4\pi}{6}G\rho^2(R^2 - r^2)$$