Estimate the Schwarzschild radius of the Earth:

To derive the Schwarzschild radius we can use dimensional analysis: we know it will depend on the mass $M_\oplus$; since it is related to gravity it should involve the gravitational constant G, and as it is a relativistic quantity it may involve the speed of light c (we could also guess c is important as r_s is the point from which not even light can escape a black hole's gravity). Let us try

$$r_s \propto G^\alpha M_\oplus^\beta c^\gamma$$

We expect $\beta > 0$, perhaps $\beta = 1$, as it makes sense that the radius increases with mass. Checking dimensions

$$[r_s] = [L]; \quad [G] = [L]^3[T]^{-2}[M]^{-1}; \quad [M] = [M]; \quad [c] = [L][T]^{-1}$$

Thus comparing each dimension

$$\begin{aligned} [L]&: \quad 1 = 3\alpha + \gamma \\ [T]&: \quad 0 = -2\alpha - \gamma \\ [M]&: \quad 0 = -\alpha + \beta \end{aligned}$$

From these $\alpha = \beta = -\gamma/2$ and so

$$\begin{aligned} 1 &= 3\alpha - 2\alpha \\ 1 &= \alpha \end{aligned}$$

Giving us

$$r_s \propto \frac{GM_\oplus}{c^2}$$

I know that the constant of proportionality is actually 2, so

$$r_s = \frac{2GM_\oplus}{c^2}$$

Inserting values

$$r_s \approx \frac{2(6.67\times 10^{-11})(6\times 10^{24})}{(3.00\times 10^{8})^2}$$

$$\approx \frac{2\times 40\times 10^{13}}{9\times 10^{16}}$$

$$\approx 8/9 \times 10^{-2}$$

$$\approx 8.9\times 10^{-3}\ \mathrm{m}$$

[Exact: $r_s = 8.87007\times 10^{-3}\ \mathrm{m}$]