2.2.17. Obvious

2.2.25. Taylor series for $\tan x$.

2.2.26.

(a) x^2, when $x \to 0$
(b) $\ln\left(\frac{x}{e}\right)$
(c) $\log x^2$
(d) $-\frac{1}{2} - \frac{x}{3}$, when $x \to 0$
(e) $-\frac{x^3}{3}$, when $x \to 0$

2.2.29

$$x^2 - 10^5 x + 1 = 0,$$

$$x = \frac{10^5 \pm \sqrt{10^{10} - 4}}{2} \approx \frac{10^5 \pm 10^5}{2} \Rightarrow \begin{cases} x_1 = 10^5 \\ x_2 = 0 \end{cases}$$

Now $x_1^2 - 10^5 x_1 + 1 \approx 10^{10} - 10^{10} = 0$, but $x_2^2 - 10^5 x_2 + 1 \neq 0$.

$$\left(\frac{-b - \sqrt{b^2 - 4ac}}{2a}\right)\left(\frac{-b + \sqrt{b^2 - 4ac}}{-b + \sqrt{b^2 - 4ac}}\right) = \frac{2c}{-b + \sqrt{b^2 - 4ac}}$$

Hence, if $b < 0$ use

$$\begin{aligned} x_1 &= \tfrac{-b+\sqrt{b^2-4ac}}{2a} = \frac{10^5 + \sqrt{10^5 - 4}}{2} \approx 10^5 \\ x_2 &= \tfrac{2c}{-b+\sqrt{b^2-4ac}} = \frac{2}{10^5 + \sqrt{10^5 - 4}} \approx 10^{-5} \end{aligned}$$