Section 5.3 Limits at Infinity p. 339 HW (1-17)ODD, 31, 35

① $\lim_{x\to\infty} \frac{2x^2+1}{3x^2-1}$ DN = 2, DD = 2 ⇒ $\frac{\text{Leading Coeff. N}}{\text{Leading Coeff D}}$ DN = DD $= \frac{2}{3}$

③ $\lim_{x\to\infty} \frac{3x^2+x+1}{2x^4-1}$ $\begin{cases} DN = 2 \\ DD = 4 \end{cases}$ DN < DD $\Big\}$ $\lim_{x\to 0} f(x) = 0$

$$\lim_{x\to\infty} \frac{\frac{2x^2}{x^2} + \frac{1}{x^2}}{\frac{3x^2}{x^2} - \frac{1}{x^2}} = \lim_{x\to\infty} \frac{2 + \frac{1}{x^2}}{3 + \frac{1}{x^2}} = \frac{2}{3}$$ ($\frac{1}{x^2} \to 0$)

$$\lim_{x\to\infty} \frac{\frac{3x^2}{x^4} + \frac{x}{x^4} + \frac{1}{x^4}}{\frac{2x^4}{x^4} - \frac{1}{x^4}} = \lim_{x\to\infty} \frac{\frac{3}{x^2} + \frac{1}{x^3} + \frac{1}{x^4}}{2 - \frac{1}{x^4}} = \frac{0}{2} = 0$$ ($\frac{3}{x^2}, \frac{1}{x^3}, \frac{1}{x^4} \to 0$)

⑤ $\lim_{x\to-\infty} (x^3+1) = +\infty$

⑦ $\lim_{x\to-\infty} \sqrt[3]{x} = -\infty$

⑨ $\lim_{x\to\infty} (1+2e^{-x})$

$\lim_{x\to\infty} \left(1 + \frac{2}{e^x}\right)$ ($\frac{2}{e^x} \to 0$)

≈ 1

⑪ $\lim_{x\to\infty} \frac{10}{2+e^{-x}}$

$\lim_{x\to\infty} \frac{10}{2 + \frac{1}{e^x}} = \frac{10}{2+0} = 5$ ($\frac{1}{e^x} \to 0$)

$\frac{P(x)}{x^2} = \left(1 + \frac{1}{x^2}\right)$

$\lim_{x\to-\infty} \frac{P(x)}{x^2} = \lim_{x\to-\infty} \left(1 + \frac{1}{x^2}\right) = 1 + 0 = 1$ ($\frac{1}{x^2} \to 0$)

$p(x) = x^2(1) = x^2$

⑬ $\lim_{x\to\infty} \frac{e^x - 1}{e^x + 1} = 1$

⑮ $\lim_{x\to\infty} \frac{x^{1/2}+1}{x+2}$ $\begin{cases} DN = 1/2 \\ DD = 1 \\ DN < DD \end{cases}$ $\Big\}$ $\lim_{x\to\infty} f(x) = 0$

$$\lim_{x\to\infty} \frac{\frac{x^{1/2}}{x} + \frac{1}{x}}{\frac{x}{x} + \frac{2}{x}} = \lim_{x\to\infty} \frac{\frac{1}{x^{1/2}} + \frac{1}{x}}{1 + \frac{2}{x}}$$ ($\frac{1}{x^{1/2}}, \frac{1}{x} \to 0$)

$$= \frac{0+0}{1+0} = 0$$

⑰ $\lim_{x\to\infty} \sqrt{4 - \frac{1}{x}}$ ($\frac{1}{x} \to 0$) $= \sqrt{4+0} = 2$

(31) $\lim_{t\to\infty} P(t) = 4$

(35) a. ii b. iii c. iv d. i