

1 次の極限值を求めよ。

$$a) \lim_{x \rightarrow 2} (x^2 - 4) = 0$$

$$b) \lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2} = \lim_{x \rightarrow 2} \frac{(x-2)(x+2)}{x-2}$$

$$= \lim_{x \rightarrow 2} (x+2) = 4$$

$$c) \lim_{x \rightarrow 2} \frac{x^2 - 4}{x + 2} = 0$$

$$d) \lim_{x \rightarrow 2} (x^3 - 8) = 0$$

$$e) \lim_{x \rightarrow 2} \frac{x^3 - 8}{x - 2} = \lim_{x \rightarrow 2} \frac{(x-2)(x^2 + 2x + 4)}{x-2}$$

$$= \lim_{x \rightarrow 2} (x^2 + 2x + 4) = 12$$

$$f) \lim_{x \rightarrow 2} \frac{x^3 - 8}{x^2 - x - 2} = \lim_{x \rightarrow 2} \frac{(x-2)(x^2 + 2x + 4)}{(x-2)(x+1)}$$

$$= \lim_{x \rightarrow 2} \frac{x^2 + 2x + 4}{x+1} = \frac{12}{3} = 4$$

$$g) \lim_{x \rightarrow 1} \frac{x^2 + 4x - 5}{x^2 + x - 2} = \lim_{x \rightarrow 1} \frac{(x-1)(x+5)}{(x-1)(x+2)}$$

$$= \lim_{x \rightarrow 1} \frac{x+5}{x+2} = \frac{6}{3} = 2$$

$$h) \lim_{x \rightarrow -1} \frac{x+1}{x^3 + 1} = \lim_{x \rightarrow -1} \frac{x+1}{(x+1)(x^2 - x + 1)}$$

$$= \lim_{x \rightarrow -1} \frac{1}{x^2 - x + 1} = \frac{1}{3}$$

$$i) \lim_{b \rightarrow a} \frac{b^2 - a^2}{b - a} = \lim_{b \rightarrow a} \frac{(b-a)(b+a)}{b-a}$$

$$= \lim_{b \rightarrow a} (b+a) = 2a$$

$$j) \lim_{h \rightarrow 0} \frac{(a+h)^2 - a^2}{h} = \lim_{h \rightarrow 0} \frac{a^2 + 2ah + h^2 - a^2}{h}$$

$$= \lim_{h \rightarrow 0} \frac{2ah + h^2}{h} = \lim_{h \rightarrow 0} (2a + h)$$

$$= 2a$$

$$k) \lim_{h \rightarrow 0} \frac{(2+h)^3 - 8}{h} = \lim_{h \rightarrow 0} \frac{8 + 12h + 6h^2 + h^3 - 8}{h}$$

$$= \lim_{h \rightarrow 0} \frac{12h + 6h^2 + h^3}{h} = \lim_{h \rightarrow 0} (12 + 6h + h^2)$$

$$= 12$$

$$l) \lim_{h \rightarrow 0} \frac{(a+h)^3 - a^3}{h} = \lim_{h \rightarrow 0} \frac{a^3 + 3ah^2 + 3ah^2 + h^3 - a^3}{h}$$

$$= \lim_{h \rightarrow 0} \frac{3a^2h + 3ah^2 + h^3}{h}$$

$$= \lim_{h \rightarrow 0} (3a^2 + 3ah + h^2) = 3a^2$$

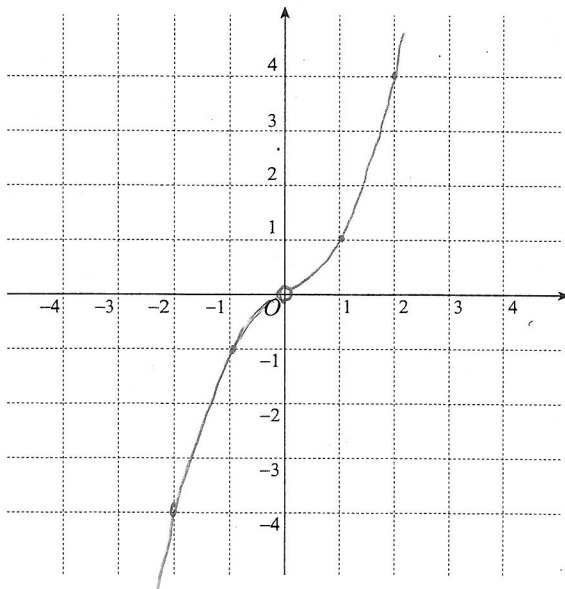
2 a) $\frac{\frac{1}{a+h} - \frac{1}{a}}{h}$ をなるべく簡単にせよ.

$$\frac{\frac{1}{a+h} - \frac{1}{a}}{h} = \frac{1}{h} \times \frac{a - (a+h)}{(a+h)a} = \frac{-h}{h(a+h)a} = \frac{-1}{a(a+h)}$$

b) $\lim_{h \rightarrow 0} \frac{\frac{1}{a+h} - \frac{1}{a}}{h}$ を求めよ.

$$\lim_{h \rightarrow 0} \frac{\frac{1}{a+h} - \frac{1}{a}}{h} = \lim_{h \rightarrow 0} \frac{-1}{a(a+h)} = -\frac{1}{a^2}$$

3 a) 関数 $y = \frac{x^3}{|x|}$ のグラフを描け.



b) $\lim_{x \rightarrow 0} \frac{x^3}{|x|}$ を求めよ.

グラフを見ればわかるように、 x が 0 に近づくとき $\frac{x^3}{|x|}$ は 0 に近づく。したがって $\lim_{x \rightarrow 0} \frac{x^3}{|x|} = 0$