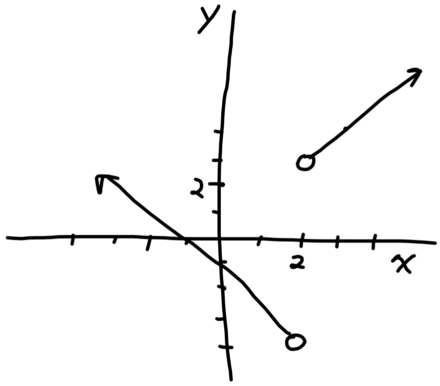
1.5

Q10c $\quad y = \dfrac{x^2 - x - 2}{|x-2|} = \dfrac{(x-2)(x+1)}{|x-2|}$

So, when $x < 2$, $y = -(x+1) = -x-1$

$x > 2$, $y = x+1$



$\therefore \lim_{x \to 2^-} y = -2-1 = -3$

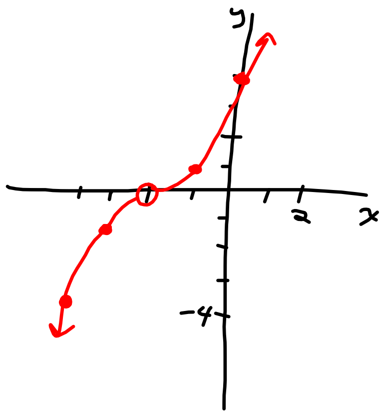
$\lim_{x \to 2^+} y = 2+1 = 3$

So $\lim_{x \to 2} y$ does NOT exist

10d $\quad y = \dfrac{(x+2)^3}{|x+2|} = \begin{cases} -(x+2)^2, & x < -2 \\ (x+2)^2, & x > -2 \end{cases}$

So, $\lim_{x \to -2^-} y = 0$

$\lim_{x \to -2^+} y = 0$



Thus $\lim_{x \to -2} y = 0$

Q17 $y = \dfrac{x^2 + |x-1| - 1}{|x-1|}$

IF $x < 1$

$\therefore\ y = \dfrac{x^2 - (x-1) - 1}{-(x-1)}$

$= \dfrac{x^2 - x}{-(x-1)}$

$= \dfrac{x(x-1)}{-(x-1)}$

$= -x$

IF $x > 1$

$\therefore\ y = \dfrac{x^2 + x - 1 - 1}{x-1}$

$= \dfrac{x^2 + x - 2}{x-1}$

$= \dfrac{(x+2)(x-1)}{x-1}$

$= x+2$

Well, $\lim\limits_{x \to 1^-} y = -1$ and $\lim\limits_{x \to 1^+} y = 1+2 = 3$

$\therefore\ \lim\limits_{x \to 1} y$ does NOT exist

Q16

$$\lim_{x \to 0} \frac{\sqrt{x+1} - \sqrt{2x+1}}{\sqrt{3x+4} - \sqrt{2x+4}} \cdot \frac{\sqrt{x+1} + \sqrt{2x+1}}{\sqrt{} + \sqrt{}} \cdot \frac{\sqrt{3x+4} + \sqrt{2x+4}}{\sqrt{} + \sqrt{}}$$

$$= \lim_{x \to 0} \frac{(x+1-2x-1)\left(\sqrt{3x+4} + \sqrt{2x+4}\right)}{(3x+4-2x-4)\left(\sqrt{x+1} + \sqrt{2x+1}\right)}$$

$$= \lim_{x \to 0} \frac{-\cancel{x}}{\cancel{x}} \cdot \left(\qquad \right)$$

$$= -1 \cdot \left(\frac{\sqrt{4} + \sqrt{4}}{\sqrt{1} + \sqrt{1}}\right)$$

$$= -2$$

8d $\lim_{x \to 1} \dfrac{x^{\frac{1}{6}} - 1}{x^{\frac{1}{3}} - 1}$

let $y = x^{\frac{1}{6}}$

$y^6 = x$

$(y^6)^{\frac{1}{3}} = x^{\frac{1}{3}}$

$y^2 = x^{\frac{1}{3}}$

$= \lim_{y \to 1} \dfrac{y - 1}{y^2 - 1}$

As $x \to 1$

$y \to 1$

8c $\lim_{x \to 1} \dfrac{x^{\frac{1}{6}} - 1}{x - 1}$

let $y = x^{\frac{1}{6}}$

$\therefore \quad y^6 = x$

As $x \to 1$

$y \to 1$

$= \lim_{y \to 1} \dfrac{y - 1}{y^6 - 1}$

$= \lim_{y \to 1} \dfrac{y - 1}{(y^3 - 1)(y^3 + 1)}$ OR $\lim_{y \to 1} \dfrac{y - 1}{(y^2 - 1)(y^4 + y^2 + 1)}$

$= \lim_{y \to 1} \dfrac{\cancel{(y-1)}}{\cancel{(y-1)}(y^2 + y + 1)(y^3 + 1)}$ OR $\lim_{y \to 1} \dfrac{\cancel{(y-1)}}{\cancel{(y-1)}(y+1)(y^4 + y^2 + 1)}$

$= \dfrac{1}{(1+1+1)(1+1)}$ OR $= \dfrac{1}{(1+1)(1+1+1)}$

$= \dfrac{1}{6}$

$= \dfrac{1}{6}$