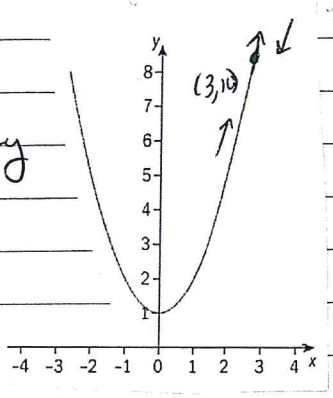
Section 7.2 Hmwk B Solutions

(1) $\lim_{x \to 3} (x^2+1)$

Just plug in $x=3$

$3^2+1 = \boxed{10}$

verify graphically

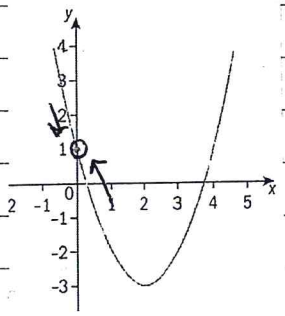


(2) $\lim_{x \to 0} \frac{x^3-4x^2+x}{x}$

Can't plug in $x=0$ → Factor! $\frac{x(x^2-4x+1)}{x} = x^2-4x+1$

now plug in $x=0$ $\quad 0^2-4(0)+1$ $\quad \boxed{1}$

verify graphically

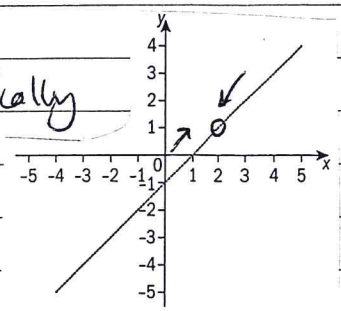


(3) $\lim_{x \to 2} \frac{x^2-3x+2}{x-2}$

Can't plug in $x=2$ → Factor! $\frac{(x-2)(x-1)}{x-2} = x-1$

now plug in $x=2$ $\quad (2)-1 = \boxed{1}$

verify graphically



(4) $\lim_{x \to 4} \frac{1}{x-4}$

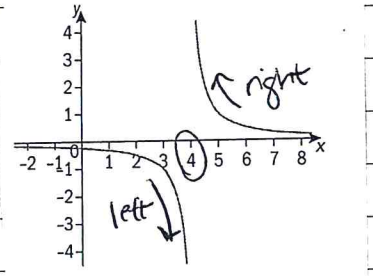
Can't plug in $x=4$
Can't factor...

plug in numbers around 4

x	f(x)
3.5	−2.0000
3.6	−2.5000
3.7	−3.3333
3.8	−5.0000
3.9	−10.0000
4.0	
4.1	10.0000
4.2	5.0000
4.3	3.3333
4.4	2.5000
4.5	2.0000

not getting close to anything

verify graphically...



left → goes to $-\infty$

right → goes to ∞

Since both sides are different ... limit does not exist

(5) $\lim_{x \to 1} f(x)$ $f(x) = \begin{cases} x+3 & \text{for } x \geq 1 \\ -x+5 & \text{for } x < 1 \end{cases}$

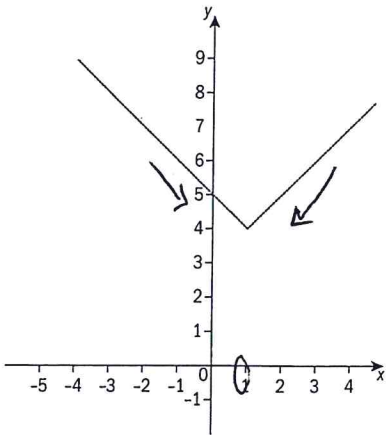
verify graphically

try plugging in 1 to both parts...

$f(1) = 1+3 = 4$
$f(1) = -1+5 = 4$

Since both parts are 4

$\lim_{x \to 1} f(x) = 4$



x	f(x)
0.5	4.5000
0.6	4.4000
0.7	4.3000
0.8	4.2000
0.9	4.1000
1.0	4.0000

x	f(x)
1.0	4.0000
1.1	4.1000
1.2	4.2000
1.3	4.3000
1.4	4.4000
1.5	4.5000

(6) $\lim_{x \to 2} f(x)$ where $f(x) = \begin{cases} x^2+3 & \text{for } x \geq 2 \\ x & \text{for } x < 2 \end{cases}$

verify graphically

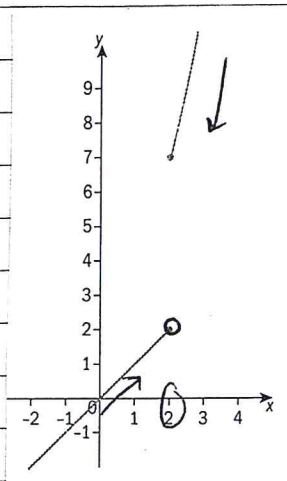
try plugging in 2 to both sides...

$f(2) = 2^2 + 3 = 7$

$f(2) = 2$

since both sides are different...

$\lim_{x \to 2} f(x)$ = Does not exist!



x	f(x)
1.5	1.5000
1.6	1.6000
1.7	1.7000
1.8	1.8000
1.9	1.9000

x	f(x)
2.0	7.0000
2.1	7.4100
2.2	7.8400
2.3	8.2900
2.4	8.7600
2.5	9.2500

Remember... both sides must approach the same value in order for a limit to exist!