Math 1A Fall 2001: Section 2.2 Solutions

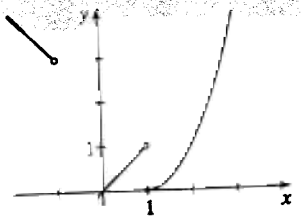
2. As x approaches 1 from the left, $f(x)$ approaches 3; and as x approaches 1 from the right, $f(x)$ approaches 7. No, the limit does not exist because the left- and right-hand limits are different.

4. (a) $\lim_{x \to 0} f(x) = 3$ (b) $\lim_{x \to 3^-} f(x) = 4$ (c) $\lim_{x \to 3^+} f(x) = 2$

(d) $\lim_{x \to 3} f(x)$ does not exist because the limits in part (b) and part (c) are not equal.

(e) $f(3) = 3$

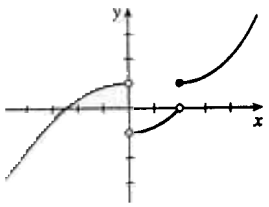
6. $\lim_{x \to a} f(x)$ exists for all a except $a = \pm 1$.



10. $\lim_{x \to 0^-} f(x) = 1$, $\lim_{x \to 0^+} f(x) = -1$,

$\lim_{x \to 2^-} f(x) = 0$, $\lim_{x \to 2^+} f(x) = 1$, $f(2) = 1$,

$f(0)$ is undefined



12. For $F(t) = \dfrac{\sqrt[3]{t} - 1}{\sqrt{t} - 1}$:

t	$F(t)$
1.5	0.643905
1.2	0.656488
1.1	0.661358
1.01	0.666114
1.001	0.666611

It appears that $\lim_{t \to 1} \dfrac{\sqrt[3]{t} - 1}{\sqrt{t} - 1} = 0.\overline{6} = \frac{2}{3}$.

18. For the curve $y = 2^x$ and the points $P(0, 1)$ and $Q(x, 2^x)$:

x	Q	m_{PQ}
0.1	(0.1, 1.0717735)	0.71773
0.01	(0.01, 1.0069556)	0.69556
0.001	(0.001, 1.0006934)	0.69339
0.0001	(0.0001, 1.0000693)	0.69317

The slope appears to be about 0.693.

20. $h(x) = \dfrac{\tan x - x}{x^3}$

(a)

x	$h(x)$
1.0	0.55740773
0.5	0.37041992
0.1	0.33467209
0.05	0.33366700
0.01	0.33334667
0.005	0.33333667

(c)

x	$h(x)$
0.001	0.33333350
0.0005	0.33333344
0.0001	0.33333000
0.00005	0.33333600
0.00001	0.33300000
0.000001	0.00000000

Here the values will vary from one calculator to another. Every calculator will eventually give *false values*.

(b) It seems that $\lim_{x \to 0} h(x) = \frac{1}{3}$.