

## 1 | Limit Laws

see pdf

## 2 | Openstax Calculus Vol1 2.3 Exercises

• Link

### 2.1 | 84

$$\lim_{x \rightarrow 1} \frac{x^3 + 3x^2 + 5}{4 - 7x} = \frac{1 + 3 + 5}{4 - 7} = \frac{9}{-3} = \boxed{-3}$$

### 2.2 | 85

$$\lim_{x \rightarrow -2} \sqrt{x^2 - 6x + 3} = \sqrt{4 - (-12) + 3} = \boxed{\sqrt{19}}$$

### 2.3 | 86

$$\lim_{x \rightarrow -1} (9x + 1)^2 = (-9 + 1)^2 = \boxed{64}$$

### 2.4 | 94

$$\lim_{x \rightarrow 4} \frac{x^2 - 16}{x - 4} = \frac{0}{4 - 4} = \frac{0}{0}$$

$$\Rightarrow \lim_{x \rightarrow 2} \frac{x - 2}{x(x - 2)} = \lim_{x \rightarrow 2} \frac{1}{x} = \boxed{\frac{1}{2}}$$

### 2.5 | 98

$$\lim_{h \rightarrow 0} \frac{\frac{1}{a+h} - \frac{1}{a}}{h} \Rightarrow \frac{\lim_{h \rightarrow 0} \frac{1}{a+h} - \lim_{h \rightarrow 0} \frac{1}{a}}{\lim_{h \rightarrow 0} h}$$

now what..?

This is just the derivative of  $\frac{1}{a}$  where  $a$  is a real valued, non zero constant. So, it should just be  $\boxed{\frac{-1}{a^2}}$ .

## 2.5.1 | In class review

$$\lim_{h \rightarrow 0} \frac{\frac{a-a-h}{(a+h)a}}{h} \Rightarrow \lim_{h \rightarrow 0} \frac{-1}{a(a+h)}$$

## 2.6 | 100

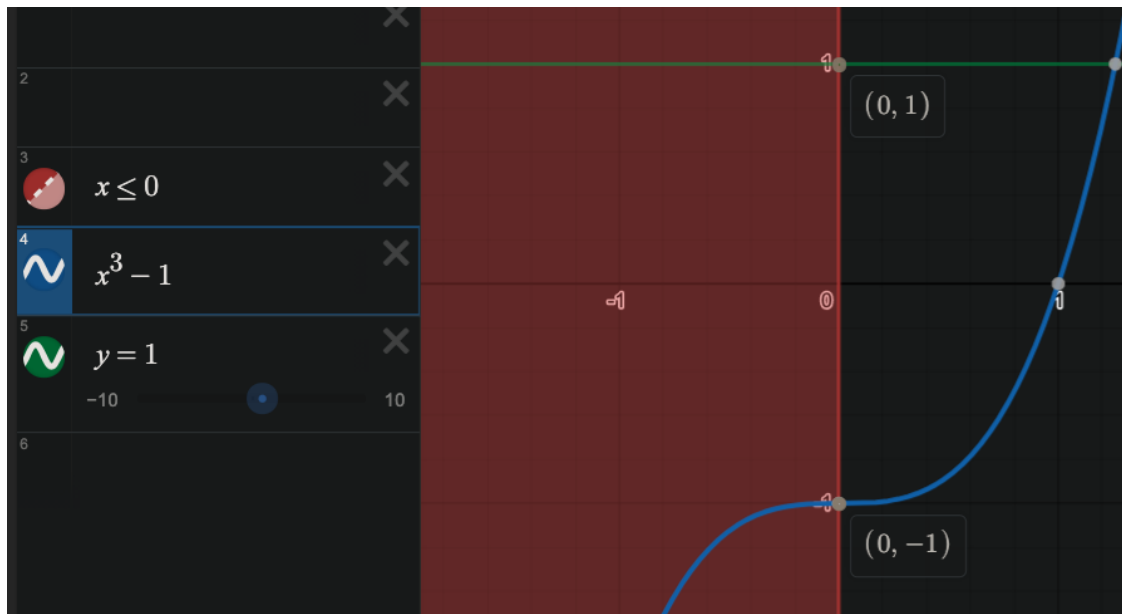
$$\lim_{x \rightarrow 1} \frac{x^3 - 1}{x^2 - 1} \Rightarrow \lim_{x \rightarrow 1} \frac{(x-1)(x^2 + 1 + x)}{(x+1)(x-1)} = \lim_{x \rightarrow 1} \frac{x^2 + x + 1}{x+1} = \boxed{\frac{3}{2}}$$

## 2.7 | Time Check

It's been an 45 minutes. I will now give up on LaTeXing things:

Problem	Result
108	2
109	7
110	108
111	$\sqrt{5}$
112	36
113	28
114	30

## 2.8 | 116



$$\boxed{-1, 1}$$

## 2.9 | Continuity

- Function compositions are continuous if their parts are continuous
  - Sum, difference, multiples, powers are continuous if you don't divide by zero or take an even root of a negative
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