

# Answers to exercises in How To Prove It

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This is to answer all the questions in the books ‘How to prove it’ by Velleman. Comments are appreciated!

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## 1 Introduction

Exercise 1.1. (a)  $a = 3$ ,  $b = 5 \Rightarrow x = 2^5 - 1 = 31$ ,  $y = 1 + 2^5 + 2^{10} = 1057$

(b) Since 32,767 is not a prime,  $2^{32,767} - 1$  is not a prime either. Therefore, there exists a positive integer  $0 < x < 2^{32,767} - 1$  such that  $2^{32,767} - 1$  is divisible by  $x$ . Hence, by (a),  $x = 2^{31} - 1$  satisfies this.

Exercise 1.2.

$n$	$3^n - 1$	$3^n - 2^n$
2, prime	8, not prime	5, prime
3, prime	26, not prime	19, prime
4	80, not prime	65, not prime
5, prime	242, not prime	211, prime
6	728, not prime	665, not prime
7, prime	2,186, not prime	2,059, prime
8	6,560, not prime	6,305, not prime
9	19,682, not prime	19,171 = $19 \cdot 1,009$ , not prime
10	59,048, not prime	58,025, not prime

## 2 Chapter 1

Exercise 2.1. OK MAN