



UW: CS 115

Introduction to Computer Science 1

Assignment 02**Assignment 02****Due date: Wednesday, February 1, 5:00 pm Eastern Time****Coverage: Module 02****Files to submit: a02q1.rkt, a02q2.rkt, a02q3.rkt****Assignment Guidelines****Language Level**

- Beginning Student

Allowable Racket Functions and Special Forms

- define, and, or, not, cond, else
- any functions on numbers found in [Section 1.6 of the documentation](#) for Beginning Student Racket

General Expectations

- Remember to use defined constants when appropriate.
- Remember to use helper functions when appropriate.
- Use the coding style that is described in the first two sections of the [Style Guide](#).
- All test data for correctness will always meet the stated assumptions for consumed values: you do not need to handle function arguments that do not conform to the function's specification.

Question 1: IPv4 Address

Internet Protocol (IP) addresses are commonly used as identifiers of computer network interfaces for exchanging messages on the Internet or an intranet. Two major versions are being used today, [version 4](#) and [version 6](#), called IPv4 and IPv6, respectively. These versions and Internet standards are developed by the Internet Engineering Task Force (IETF) and published as RFC documents. Nowadays, to ensure compatibility, IPv4 and IPv6 co-exist on a computer usually built-in with an operating system called the "dual-stack" approach.

A simple but important task is checking whether an IP address is valid. Let us take a look at the IPv4 address as a starting point. An IPv4 address can be expressed in 4 decimal numbers separated by dots, as shown below, where each number can be any integer between 0 and 255 (inclusive).

192.168.1.16

Write a function `valid-ipv4addr?` that consumes four numbers, indicating four decimal numbers (in the order from left to right) of an IPv4 address, and produces `true` if and only if all four numbers are integers between 0 and 255 inclusive, and `false` otherwise.

For example:

```
> (valid-ipv4addr? 255 255 255 255)
true
> (valid-ipv4addr? 0 0 0 0)
true
> (valid-ipv4addr? 192 168 1 2)
true
> (valid-ipv4addr? 8 8 8 8)
true
> (valid-ipv4addr? 288 1 8 8)
false
> (valid-ipv4addr? 190.1 1 8.2 8)
false
```

Save your code in a file called `a02q1.rkt` and submit it to MarkUs.

Question 2: Area Code of a Phone Number

Phone numbers are usually administrated at a national level. An area code of a phone number can be used to determine if a 10-digit Canadian phone number is local or within a specific region, as shown below. The first three digits of a phone number are considered an area code. Currently, the area code in Greater Toronto Area (GTA) is 416, 437, or 647.

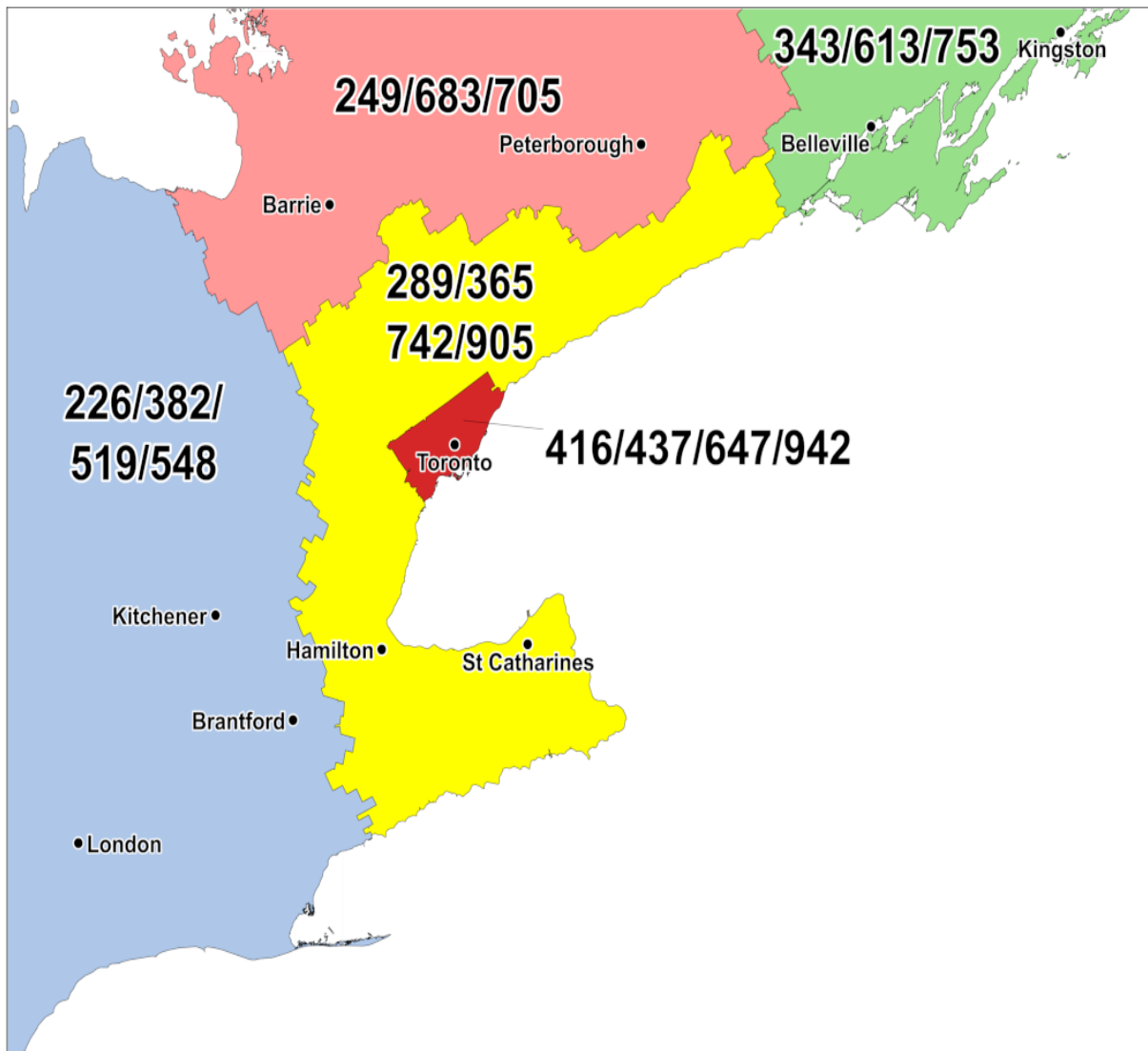


Fig.1: Area codes in Southern Ontario (Source: Canadian Numbering Administrator)

Write a function `gta-number?` that consumes a phone number and produces a Boolean value (`true` if the number is in GTA and `false` otherwise). You can assume the phone number given is a valid 10-digit number, so you do not need to check the format, such as length and sign.

For example:

```
> (gta-number? 4163922489)
true
> (gta-number? 5198884567)
false
> (gta-number? 4163975981)
true
> (gta-number? 6471234567)
true
> (gta-number? 4371234567)
true
```

Save your code in a file called `a02q2.rkt` and submit it to MarkUs.

Question 3: Ordering customized photo mugs

ABC Photo Centre sells custom printed photo mugs. Like many places, the price per unit decreases with large orders. In addition, they like to reward loyal customers (those who have more than 3 previous orders with them) by providing further discounts on large orders. Details, including charges for initial set-up, are provided in the table below.

	Cost	Loyalty discount (strictly greater than 3 previous orders)
Set-up cost for printing	\$5	Free
First 10 mugs	\$13.97 per unit	No discount
Next 50 mugs	\$11.97 per unit	\$11.50 per unit
Additional mugs	\$10.97 per unit	Buy 5, get one free, using the \$10.97 per unit price

Write a function `photo-mugs` that consumes a positive integer for the number of photo mugs being ordered, a natural number for number of previous orders, and produces the total cost of the order for the mugs. *Do not round the final answer in any way.*

For example,

```
> (photo-mugs 1 1)
18.97
> (photo-mugs 10 6)
139.7
> (photo-mugs 60 9)
714.7
> (photo-mugs 65 3)
798.05
> (photo-mugs 66 4)
769.55
```

Save your code in a file called `a02q3.rkt` and submit it to MarkUs.