CS 115 – Winter 2019

Extra Practice Problems (Module 1)

1. Translate the following into Racket functions:

a. $f(x, y, z) = x * (y + 10) + \sqrt{z^2 - 4}$

Examples (Try these on your interactions window):

- (f 0 0 2) → 0
- (f 10 10 0) → $200 + 2i$
- (f 0 10 2) → 0
- (f − 10 0 2) → 100
- (f 0 0 10) → #i9.797958971132712

b. $g(x, y) = \frac{x^2 - y^2}{(x+4)^2} - 1$

Examples:

- (g 0 0) → −1
- (g 1 0) → −0.96
- (g 10 −4) → $-0.\overline{571428}$
- (g − 4 10) → */: division by zero*

2. Write a function *extract-middle* to produce the middle digit from a three digit number.

Examples:

- (extract − middle 222) => 2
- (extract − middle 841) => 4

3. Write a function called *remainder-fn* that consumes two natural numbers and produces the remainder of a number ***without using the remainder and quotient function*** introduced in class. Hint: section 1.5 of Racket documentation.

Examples:

- (remainder-fn 10 3) => 1
- (remainder-fn 5 5) => 0

4. Using a constant for the total number of labs (12), given that the 1st lab is not for marks, write a function *lab-mark* that determines your total lab grade (out of 100) given the number of labs you passed. (if you passed 11 labs your lab-mark is 100))

Examples:

- (lab-mark 11) => 100
- (lab-mark 7) => 63.63…
- (lab-mark 10) => 90.90…
- (lab-mark 0) => 0

5. Stepping Problems: for each function call, write out each step line by line.

a.

```
(define (hello x y)
  (* x (+ y x 4) y))

(hello 6 3)
```

b.

```
(define a 4)
(define b 5)
(define (f x)
  (* (+ 4 x) (+ 5 x)))

(+ (f a) (f b))
```