*** Submit the code (.scm file) on Canvas.

1. Symbolic differentiation. The rules of differentiation are given as follows.

$$\frac{d}{dx}(c) = 0$$

$$\frac{d}{dx}(x) = 1$$

$$\frac{d}{dx}(u + v) = \frac{du}{dx} + \frac{dv}{dx}$$

$$\frac{d}{dx}(u - v) = \frac{du}{dx} - \frac{dv}{dx}$$

$$\frac{d}{dx}(u * v) = u\frac{dv}{dx} + v\frac{du}{dx}$$

$$\frac{d}{dx}(u/v) = \left(v\frac{du}{dx} - u\frac{dv}{dx}\right)/v^2$$

Write a function named **diff** to differentiate an expression with respect to x.

For example, (diff 'x 'x) => 1 ,

(diff 'x '(+ (* 2 x) 1)) => (+ (+ (* x 0) (* 2 1)) 0)

Hint: you can use the built-in functions symbol? and number? for the basis cases.

```
(define (diff x expr)
  (cond ((or (number? expr) (symbol? expr)) (if (eq? expr x) 1 0))
        (else ...
```

2. Implement a map, which is an abstract data structure that stores a collection of (key, value) pairs. Your implementation should at least support the following operations:

+ initialize the map
+ get the size of the map
+ insert a pair (key, value) into the map
+ get the value for a given key
+ remove the pair from the map with a given key

Please include your test cases in the code.