5a: [HKK 5.15] Write a higher-order procedure called `make-function-with-exception` that takes two numbers and a procedure as parameters and returns a procedure that has the same behavior as the procedural argument except when given a special argument. The two numerical arguments to `make-function-with-exception` specify what that exceptional argument is and what the procedure made by `make-function-with-exception` should return in that case. For example, the `usually-sqrt` procedure that follows behaves like `sqrt`, except that when given the argument 7, it returns the result 2:

```
(define usually-sqrt
  (make-function-with-exception 7 2 sqrt))

(usually-sqrt 9)
3

(usually-sqrt 16)
4

(usually-sqrt 7)
2
```

5b: [HKK 5.16] If two procedures f and g are both procedures of a single argument such that the values produced by g are legal arguments to f, the *composition* of f and g is defined to be the procedure that first applies g to its argument and then applies f to the result. Write a procedure called `compose` that takes two one-argument procedures and returns the procedure that is their composition. For example, `((compose sqrt abs) -4)` should compute the square root of the absolute value of -4.

5c: [HKK 5.20] Suppose the following have been defined:

```
(define f
  (lambda (m b)
    (lambda (x) (+ (* m x) b))))

(define g (f 3 2))
```

For each of the following expressions, indicate whether an error would be signaled, the value would be a procedure, or the value would be a number. If an error is signaled, explain briefly the nature of the error. If the value is a procedure, specify how many arguments the procedure expects. If the value is a number, specify which number.

(a) `f`
(b) `g`
(c) `(* (f 3 2) 7)`
(d) `(g 6)`
(e) `(f 6)`
(f) `((f 4 7) 5)`

5d: Write a procedure `(estimate-integral f a b)` which estimates the integral $\int_a^b f(x)\,dx$. (Do not panic if you have not had calculus.) One way to do this is by a Riemann sum. For example,

$$\int_2^5 f(x)\,dx \approx .01 \cdot [f(2.00) + f(2.01) + f(2.02) + \cdots + f(4.99)]$$

More generally,

$$\int_a^b f(x)\,dx \approx \delta \cdot [f(a) + f(a+\delta) + f(a+2\delta) + f(a+3\delta) + \cdots + f(a+n\delta)]$$

where δ is a small positive number and $a + n\delta \approx b$.

(a) Write the procedure `(estimate-integral f a b)`, fixing $\delta = .01$ as in the first example above. Refer to any calculus textbook to identify a few test cases.

(b) Write the procedure `(estimate-integral-with-step f a b delta)` which takes the step δ as an argument.

(c) Write a procedure `(make-integrater delta)` which takes an argument δ and returns a procedure. That procedure should accept three arguments `f`, `a`, and `b`, and estimate $\int_a^b f(x)\,dx$ using a Riemann sum with step δ.

(d) Optional: Can you find functions for which this Riemann sum gives a very bad estimate? Can you improve the program to work with some of these troublesome functions?