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ICS 313
Quiz #6
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Quiz #6:

What Lisp function would you use (besides setf) to:

a. Join together several lists.

Answer:

```
Command:        append
Example:        (append '(a) (c d)) ; the result is (a b c)
```

b. Set a variable to a list minus its first element.

Answer:

```
Command:        rest
Example:        (rest '(a b c))     ; the result is (b c)

Command:        pop
Example:        (setf x '(a b c))   ; sets x to (a b c)
                (setf y (pop x))    ; sets y to (b c)
```

c. Write the Lisp form to multiply x and y.

Answer:

```
Command:        (* x y)             ; multiply x and y
```

d. Describe what the `cond` function does:

```
(cond (predicate actions) … (predicate actions))
```

Answer:

The predicates are evaluated from left to right until the first one whose value is t is found. Then the actions associated with that predicate are carried out, and the function terminates. Example:

```
(cond ((minusp x) (setf z -1))     ; sets z = -1 if x < 0
      ((zerop x)  (setf z 0)       ; sets z = 0,
                  (setf x 1)))     ; and x = 1 if x = 0
```

Here if x is negative, z is set to -1; whereas if x is zero, then z is set to zero and x is set to 1.

e. Without using `expt`, write a function which evaluates x^y called power.

Answer:

Define the function recursively:

```
(defun power (x y)                 ; define function
     (if (zerop y) (return-from power 1)
          (return-from power (* x (power x (- y 1))))))
```

Define the function iteratively:

```
(defun power (x y)                 ; define function
     (setf result 1)               ; local variable
     (dotimes (v y)                ; loop y times
          (setf result (* result x)))
     (return-from power result))   ; return result
```