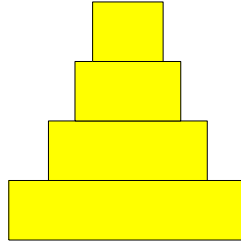# 1 Build your own step pyramid

Complete the script `stepPyramidSkeleton.m` to draw a step pyramid. The base rectangle is L-by-H where $H \leq L$. Each step has the same height H. The next rectangle up is $2/3$ the length of the rectangle below, and so forth. The top step must have a length no less than H.

You will need function `DrawRect`—download it from the *Insight* page of the course website and put it in your current directory (the directory from which you will run your script). Use a `while`-loop.

2 Fibonacci numbers

You should read *Insight* §3.2 before doing the following exercise. Download the following script:

```
% Fibonacci
clc
f_old = 0;
f_cur = 1;
n = 1;
% f_cur is the nth Fibonacci number
while (n<=10)
    fprintf('%2d %10d\n',n,f_cur)
    % Update:
    f_new = f_old + f_cur;
    f_old = f_cur;
    f_cur = f_new;
    n = n+1;
end
```

It displays the ten Fibonacci numbers $f_1, \ldots, f_{10}$.

(a) Save the file as `fib1mil.m` (you will need the original file for part (b)). Modify the script so that it prints all Fibonacci numbers that are greater than ten thousand but less than one million.

(b) Start from the original file `fibonacci.m`. Modify the script so that it prints the smallest n such that

$$\left| \frac{f_{n+1}}{f_n} - \frac{1+\sqrt{5}}{2} \right| \leq .000001$$

3   Binomial Coefficients

The number of ways that you can select k objects from n objects is given by the binomial coefficient

$$\binom{n}{k} = \frac{n!}{k!(n-k)!}$$

Thus,

$$\binom{10}{1} = \frac{10!}{1!9!} = 10$$

$$\binom{10}{2} = \frac{10!}{2!8!} = 45$$

$$\binom{10}{3} = \frac{10!}{3!7!} = 120$$

Recall that if `x` houses a positive integer, then the value of `floor(log10(x))+1` is the number of base-10 digits that are required to write the value of `x`. Write a script that produces ten lines of output. The nth line should display the number of digits required to write down each of the binomial coefficients

$$\binom{n}{1}, \binom{n}{2}, \ldots, \binom{n}{n}$$

Thus, the nth line of output will display n numbers. Make use of the function `factorial`.

Please delete your files from the computer before leaving the lab!