

# BIS 420 PROGRAMMING FOR DATA SCIENCE

## PRAJAKTA POHARE CHAPTER 6 EXERCISE 6.5

### ILLINOIS STATE UNIVERSITY

The Ackermann function,  $A(m, n)$ , is defined:

$$A(m, n) = \begin{cases} n + 1 & \text{if } m = 0 \\ A(m - 1, 1) & \text{if } m > 0 \text{ and } n = 0 \\ A(m - 1, A(m, n - 1)) & \text{if } m > 0 \text{ and } n > 0. \end{cases}$$

Write a function named `ack` that evaluates Ackermann's function. Use your function to evaluate `ack(3, 4)`, which should be 125. What happens for larger values of  $m$  and  $n$ ?

Code:

```
def ack(m, n):  
    if m == 0:  
        return n + 1  
    elif m > 0 and n == 0:  
        return ack(m - 1, 1)  
    elif m > 0 and n > 0:  
        return ack(m - 1, ack(m, n - 1))
```

```
result = ack(3, 4)
```

```
print(result)
```

```
Users > prajaktapohare > Library > CloudStorage > OneDrive-ILStateUniversity > BIS420 > Week 6 > BIS420_PrajaktaPohare_Ch6_6.5.py > ...  
1  def ack(m, n):  
2      if m == 0:  
3          return n + 1  
4      elif m > 0 and n == 0:  
5          return ack(m - 1, 1)  
6      elif m > 0 and n > 0:  
7          return ack(m - 1, ack(m, n - 1))  
8  
9  result = ack(3, 4)  
10 print(result) |
```