

ONE-INDEX METHOD & LOGICAL ARRAY & MASKS

Starting with the largest, which uses control logic and loops, several solutions are presented until the use of logical arrays. The following was a question for the Exam#2 for some sections.

P#9. Write matlab code to determine and print the largest prime number in a 2D array. Prime numbers are only divisible by 1 and itself. For instance, 5 is prime because it is only divisible exactly by 1 and 5. On the other hand, 8 is not prime because it is divisible by 1, 2, 4, 8. Hint: You can use any method, but consider the mod function to compute the remainder of an integer division and a flag or counter variable. All matlab library functions are allowed in this problem.

	X =						
		3	7	14	29	22	4
		10	21	18	34	11	8
		25	35	40	37	26	15
		31	38	1	42	30	19
		17	24	41	39	27	23
		13	20	32	36	16	12
		2	6	28	33	9	5

```
% Problem9.m
% This algorithm uses one-index method to reference the values of X
```

```
clc, clear
X=[3  7  14  29  22  4
10  21  18  34  11  8
25  35  40  37  26  15
31  38  1  42  30  19
17  24  41  39  27  23
13  20  32  36  16  12
2   6  28  33  9   5];

N=numel(X);
flag=1; j=1;

for k=1:N           % k [X-index]
    for i=2:X(k)-1 % i [divisor candidate]
        if mod(X(k),i)==0 % note X(one-index)
            flag=0;
        end
    end
    if flag==1 & X(k)~=1
        primes(j)=X(k); % stores prime numbers
        j=j+1;
    end
    flag=1;
end
fprintf('The largest prime is %d ',max(primes));
fprintf('\n');
```

Another improved solution:

```
% Problem9.m
% This algorithm uses one-index method to
% reference the values of X

clc, clear
load X.m          % Assumes X.m is a file containing the data.
N=numel(X);
j=1;
for k=1:N
    if isprime(X(k)) % isprime returns 0 [false] or 1 [true]
        primes(j)=X(k);
        j=j+1;
    end
end
fprintf('The largest prime is %d ',max(primes));
fprintf('\n');
```

Another efficient solution (the goal of this document):

```
% Problem9.m
% This algorithm uses one-index method to
% reference the values of X and logical arrays.

clc, clear
load X.m          % Assumes X.m is a file containing the data.
N=numel(X);
primes=X(isprime(X)); % isprime(X) is a logical array
fprintf('The largest prime is %d ',max(primes));
fprintf('\n');
```