

Experiment No.

Ex6.1

Name:

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DATE: / /

#include &lt;stdio.h&gt;

int fact\_recursive (int n)

{

if (n==0)

return 1;

else

return n \* fact\_recursive (n-1);

}

int fact = 1;

for (int i=1; i&lt;=n; i++)

{ fact \*= i;

}

return fact; }

int binomial\_recursive (int n, int r)

{ return fact\_recursive (n) / fact\_recursive (r) \*

fact\_recursive (n-r); }

}

int binomial\_non\_recursive (int n, int r)

{ return fact\_nonrecursive (n) / fact\_nonrecursive

fact\_nonrecursive (n-r); }

int main()

{ int n, r;

printf ("enter n: ");

scanf ("%d", &amp;n);

printf ("enter r: ");

scanf ("%d", &amp;r); }

Teacher's Signature:

```
if (x>n || n<0 || r<0) {  
    printf ("invalid input! x must be <=n and  
    both >=0, \n");  
    return 0 ;  
}  
printf ("\n Results in tabular form : ");  
printf ("----- \n");  
printf ("n | x | C(n,x) recursive | C(n,x) non-recu-  
-rsive \n");  
printf ("----- \n");  
for int i=0 ; i<=n ; i++ )  
{  
    for int j=0 ; j<=i ; j++)  
    {  
        printf ("%d %d %d %d \n", i,j,  
        binomial - recursive (i,j); binomial  
        - nonrecursive (i,j));  
    }  
    printf ("----- \n");  
return 0 ; }
```

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main.c

```
1 #include <stdio.h>
2     int fact_recursive (int n)
3     {
4         if (n==0)
5             return 1;
6         else
7             return n* fact_recursive(n-1);
8     }
9     int fact_nonrecursive (int n)
10    {
11        int fact = 1;
12        for (int i = 1; i <= n; i++)
13        {
14            fact*= i;
15        }
16        return fact;
17    }
18    int binomial_recursive (int n, int r)
19    {
20        return fact_recursive (n)/fact_recursive(r)*fact_recursive(n-r);
21    }
22    int binomial_nonrecursive(int n, int r)
23    {
24        return fact_nonrecursive(n)/fact_nonrecursive(r)
25            *fact_nonrecursive(n-r);
26    }

```

Run

Output

Clear

enter n: 5  
enter r: 2

Results in tabular form:

n	r	c(n,r)recursive	c(n,r)nonrecursive
0	0	1	1
1	0	1	1
1	1	1	1
2	0	4	1
2	1	2	1
2	2	1	1
3	0	36	1
3	1	12	1
3	2	3	1
3	3	1	1
4	0	576	1
4	1	144	1
4	2	24	1
4	3	4	1
4	4	1	1
5	0	14400	1
5	1	2880	1
5	2	360	1
5	3	40	1

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main.c

```
24     return fact_nonrecursive(n)/fact_nonrecursive(r
25         )*fact_nonrecursive(n-r);
26     }
27     int main ()
28     {
29         int n , r;
30
31         printf("enter n: ");
32         scanf("%d",&n);
33         printf("enter r: ");
34         scanf("%d",&r);
35
36         if(r > n || n < 0 || r < 0){
37             printf("invlaid input ! r must be <= n and both >= 0,\n");
38             return 0;
39         }
40         printf("\n Results in tabular form: ");
41         printf("-
42             -----\n");
43         printf("n | r| c(n,r)recursive | c(n,r)nonrecursive \n");
44         printf("-----\n");
45         printf("0 | 0 | 1 | 1
46             1 | 0 | 1 | 1
47             1 | 1 | 1 | 1
48             2 | 0 | 4 | 1
49             2 | 1 | 2 | 1
50             2 | 2 | 1 | 1
51             3 | 0 | 36 | 1
52             3 | 1 | 12 | 1
53             3 | 2 | 3 | 1
54             3 | 3 | 1 | 1
55             4 | 0 | 576 | 1
56             4 | 1 | 144 | 1
57             4 | 2 | 24 | 1
58             4 | 3 | 4 | 1
59             4 | 4 | 1 | 1
60             5 | 0 | 14400 | 1
61             5 | 1 | 2880 | 1
62             5 | 2 | 360 | 1
63             5 | 3 | 40 | 1
64             5 | 4 | 5 | 1
65             5 | 5 | 1 | 1
66         );
67         printf("-----\n");
68         printf("n | r| c(n,r)recursive | c(n,r)nonrecursive \n");
69         printf("-----\n");
70         printf("0 | 0 | 1 | 1
71             1 | 0 | 1 | 1
72             1 | 1 | 1 | 1
73             2 | 0 | 4 | 1
74             2 | 1 | 2 | 1
75             2 | 2 | 1 | 1
76             3 | 0 | 36 | 1
77             3 | 1 | 12 | 1
78             3 | 2 | 3 | 1
79             3 | 3 | 1 | 1
80             4 | 0 | 576 | 1
81             4 | 1 | 144 | 1
82             4 | 2 | 24 | 1
83             4 | 3 | 4 | 1
84             4 | 4 | 1 | 1
85             5 | 0 | 14400 | 1
86             5 | 1 | 2880 | 1
87             5 | 2 | 360 | 1
88             5 | 3 | 40 | 1
89             5 | 4 | 5 | 1
90             5 | 5 | 1 | 1
91         );
92         printf("-----\n");
93         printf("n | r| c(n,r)recursive | c(n,r)nonrecursive \n");
94         printf("-----\n");
95         printf("0 | 0 | 1 | 1
96             1 | 0 | 1 | 1
97             1 | 1 | 1 | 1
98             2 | 0 | 4 | 1
99             2 | 1 | 2 | 1
100            2 | 2 | 1 | 1
101            3 | 0 | 36 | 1
102            3 | 1 | 12 | 1
103            3 | 2 | 3 | 1
104            3 | 3 | 1 | 1
105            4 | 0 | 576 | 1
106            4 | 1 | 144 | 1
107            4 | 2 | 24 | 1
108            4 | 3 | 4 | 1
109            4 | 4 | 1 | 1
110            5 | 0 | 14400 | 1
111            5 | 1 | 2880 | 1
112            5 | 2 | 360 | 1
113            5 | 3 | 40 | 1
114            5 | 4 | 5 | 1
115            5 | 5 | 1 | 1
116        );
117        printf("-----\n");
118        printf("n | r| c(n,r)recursive | c(n,r)nonrecursive \n");
119        printf("-----\n");
120        printf("0 | 0 | 1 | 1
121            1 | 0 | 1 | 1
122            1 | 1 | 1 | 1
123            2 | 0 | 4 | 1
124            2 | 1 | 2 | 1
125            2 | 2 | 1 | 1
126            3 | 0 | 36 | 1
127            3 | 1 | 12 | 1
128            3 | 2 | 3 | 1
129            3 | 3 | 1 | 1
130            4 | 0 | 576 | 1
131            4 | 1 | 144 | 1
132            4 | 2 | 24 | 1
133            4 | 3 | 4 | 1
134            4 | 4 | 1 | 1
135            5 | 0 | 14400 | 1
136            5 | 1 | 2880 | 1
137            5 | 2 | 360 | 1
138            5 | 3 | 40 | 1
139            5 | 4 | 5 | 1
140            5 | 5 | 1 | 1
141        );
142        printf("-----\n");
143        printf("n | r| c(n,r)recursive | c(n,r)nonrecursive \n");
144        printf("-----\n");
145        printf("0 | 0 | 1 | 1
146            1 | 0 | 1 | 1
147            1 | 1 | 1 | 1
148            2 | 0 | 4 | 1
149            2 | 1 | 2 | 1
150            2 | 2 | 1 | 1
151            3 | 0 | 36 | 1
152            3 | 1 | 12 | 1
153            3 | 2 | 3 | 1
154            3 | 3 | 1 | 1
155            4 | 0 | 576 | 1
156            4 | 1 | 144 | 1
157            4 | 2 | 24 | 1
158            4 | 3 | 4 | 1
159            4 | 4 | 1 | 1
160            5 | 0 | 14400 | 1
161            5 | 1 | 2880 | 1
162            5 | 2 | 360 | 1
163            5 | 3 | 40 | 1
164            5 | 4 | 5 | 1
165            5 | 5 | 1 | 1
166        );
167        printf("-----\n");
168        printf("n | r| c(n,r)recursive | c(n,r)nonrecursive \n");
169        printf("-----\n");
170        printf("0 | 0 | 1 | 1
171            1 | 0 | 1 | 1
172            1 | 1 | 1 | 1
173            2 | 0 | 4 | 1
174            2 | 1 | 2 | 1
175            2 | 2 | 1 | 1
176            3 | 0 | 36 | 1
177            3 | 1 | 12 | 1
178            3 | 2 | 3 | 1
179            3 | 3 | 1 | 1
180            4 | 0 | 576 | 1
181            4 | 1 | 144 | 1
182            4 | 2 | 24 | 1
183            4 | 3 | 4 | 1
184            4 | 4 | 1 | 1
185            5 | 0 | 14400 | 1
186            5 | 1 | 2880 | 1
187            5 | 2 | 360 | 1
188            5 | 3 | 40 | 1
189            5 | 4 | 5 | 1
190            5 | 5 | 1 | 1
191        );
192        printf("-----\n");
193        printf("n | r| c(n,r)recursive | c(n,r)nonrecursive \n");
194        printf("-----\n");
195        printf("0 | 0 | 1 | 1
196            1 | 0 | 1 | 1
197            1 | 1 | 1 | 1
198            2 | 0 | 4 | 1
199            2 | 1 | 2 | 1
200            2 | 2 | 1 | 1
201            3 | 0 | 36 | 1
202            3 | 1 | 12 | 1
203            3 | 2 | 3 | 1
204            3 | 3 | 1 | 1
205            4 | 0 | 576 | 1
206            4 | 1 | 144 | 1
207            4 | 2 | 24 | 1
208            4 | 3 | 4 | 1
209            4 | 4 | 1 | 1
210            5 | 0 | 14400 | 1
211            5 | 1 | 2880 | 1
212            5 | 2 | 360 | 1
213            5 | 3 | 40 | 1
214            5 | 4 | 5 | 1
215            5 | 5 | 1 | 1
216        );
217        printf("-----\n");
218        printf("n | r| c(n,r)recursive | c(n,r)nonrecursive \n");
219        printf("-----\n");
220        printf("0 | 0 | 1 | 1
221            1 | 0 | 1 | 1
222            1 | 1 | 1 | 1
223            2 | 0 | 4 | 1
224            2 | 1 | 2 | 1
225            2 | 2 | 1 | 1
226            3 | 0 | 36 | 1
227            3 | 1 | 12 | 1
228            3 | 2 | 3 | 1
229            3 | 3 | 1 | 1
230            4 | 0 | 576 | 1
231            4 | 1 | 144 | 1
232            4 | 2 | 24 | 1
233            4 | 3 | 4 | 1
234            4 | 4 | 1 | 1
235            5 | 0 | 14400 | 1
236            5 | 1 | 2880 | 1
237            5 | 2 | 360 | 1
238            5 | 3 | 40 | 1
239            5 | 4 | 5 | 1
240            5 | 5 | 1 | 1
241        );
242        printf("-----\n");
243        printf("n | r| c(n,r)recursive | c(n,r)nonrecursive \n");
244        printf("-----\n");
245        printf("0 | 0 | 1 | 1
246            1 | 0 | 1 | 1
247            1 | 1 | 1 | 1
248            2 | 0 | 4 | 1
249            2 | 1 | 2 | 1
250            2 | 2 | 1 | 1
251            3 | 0 | 36 | 1
252            3 | 1 | 12 | 1
253            3 | 2 | 3 | 1
254            3 | 3 | 1 | 1
255            4 | 0 | 576 | 1
256            4 | 1 | 144 | 1
257            4 | 2 | 24 | 1
258            4 | 3 | 4 | 1
259            4 | 4 | 1 | 1
260            5 | 0 | 14400 | 1
261            5 | 1 | 2880 | 1
262            5 | 2 | 360 | 1
263            5 | 3 | 40 | 1
264            5 | 4 | 5 | 1
265            5 | 5 | 1 | 1
266        );
267        printf("-----\n");
268        printf("n | r| c(n,r)recursive | c(n,r)nonrecursive \n");
269        printf("-----\n");
270        printf("0 | 0 | 1 | 1
271            1 | 0 | 1 | 1
272            1 | 1 | 1 | 1
273            2 | 0 | 4 | 1
274            2 | 1 | 2 | 1
275            2 | 2 | 1 | 1
276            3 | 0 | 36 | 1
277            3 | 1 | 12 | 1
278            3 | 2 | 3 | 1
279            3 | 3 | 1 | 1
280            4 | 0 | 576 | 1
281            4 | 1 | 144 | 1
282            4 | 2 | 24 | 1
283            4 | 3 | 4 | 1
284            4 | 4 | 1 | 1
285            5 | 0 | 14400 | 1
286            5 | 1 | 2880 | 1
287            5 | 2 | 360 | 1
288            5 | 3 | 40 | 1
289            5 | 4 | 5 | 1
290            5 | 5 | 1 | 1
291        );
292        printf("-----\n");
293        printf("n | r| c(n,r)recursive | c(n,r)nonrecursive \n");
294        printf("-----\n");
295        printf("0 | 0 | 1 | 1
296            1 | 0 | 1 | 1
297            1 | 1 | 1 | 1
298            2 | 0 | 4 | 1
299            2 | 1 | 2 | 1
300            2 | 2 | 1 | 1
301            3 | 0 | 36 | 1
302            3 | 1 | 12 | 1
303            3 | 2 | 3 | 1
304            3 | 3 | 1 | 1
305            4 | 0 | 576 | 1
306            4 | 1 | 144 | 1
307            4 | 2 | 24 | 1
308            4 | 3 | 4 | 1
309            4 | 4 | 1 | 1
310            5 | 0 | 14400 | 1
311            5 | 1 | 2880 | 1
312            5 | 2 | 360 | 1
313            5 | 3 | 40 | 1
314            5 | 4 | 5 | 1
315            5 | 5 | 1 | 1
316        );
317        printf("-----\n");
318        printf("n | r| c(n,r)recursive | c(n,r)nonrecursive \n");
319        printf("-----\n");
320        printf("0 | 0 | 1 | 1
321            1 | 0 | 1 | 1
322            1 | 1 | 1 | 1
323            2 | 0 | 4 | 1
324            2 | 1 | 2 | 1
325            2 | 2 | 1 | 1
326            3 | 0 | 36 | 1
327            3 | 1 | 12 | 1
328            3 | 2 | 3 | 1
329            3 | 3 | 1 | 1
330            4 | 0 | 576 | 1
331            4 | 1 | 144 | 1
332            4 | 2 | 24 | 1
333            4 | 3 | 4 | 1
334            4 | 4 | 1 | 1
335            5 | 0 | 14400 | 1
336            5 | 1 | 2880 | 1
337            5 | 2 | 360 | 1
338            5 | 3 | 40 | 1
339            5 | 4 | 5 | 1
340            5 | 5 | 1 | 1
341        );
342        printf("-----\n");
343        printf("n | r| c(n,r)recursive | c(n,r)nonrecursive \n");
344        printf("-----\n");
345        printf("0 | 0 | 1 | 1
346            1 | 0 | 1 | 1
347            1 | 1 | 1 | 1
348            2 | 0 | 4 | 1
349            2 | 1 | 2 | 1
350            2 | 2 | 1 | 1
351            3 | 0 | 36 | 1
352            3 | 1 | 12 | 1
353            3 | 2 | 3 | 1
354            3 | 3 | 1 | 1
355            4 | 0 | 576 | 1
356            4 | 1 | 144 | 1
357            4 | 2 | 24 | 1
358            4 | 3 | 4 | 1
359            4 | 4 | 1 | 1
360            5 | 0 | 14400 | 1
361            5 | 1 | 2880 | 1
362            5 | 2 | 360 | 1
363            5 | 3 | 40 | 1
364            5 | 4 | 5 | 1
365            5 | 5 | 1 | 1
366        );
367        printf("-----\n");
368        printf("n | r| c(n,r)recursive | c(n,r)nonrecursive \n");
369        printf("-----\n");
370        printf("0 | 0 | 1 | 1
371            1 | 0 | 1 | 1
372            1 | 1 | 1 | 1
373            2 | 0 | 4 | 1
374            2 | 1 | 2 | 1
375            2 | 2 | 1 | 1
376            3 | 0 | 36 | 1
377            3 | 1 | 12 | 1
378            3 | 2 | 3 | 1
379            3 | 3 | 1 | 1
380            4 | 0 | 576 | 1
381            4 | 1 | 144 | 1
382            4 | 2 | 24 | 1
383            4 | 3 | 4 | 1
384            4 | 4 | 1 | 1
385            5 | 0 | 14400 | 1
386            5 | 1 | 2880 | 1
387            5 | 2 | 360 | 1
388            5 | 3 | 40 | 1
389            5 | 4 | 5 | 1
390            5 | 5 | 1 | 1
391        );
392        printf("-----\n");
393        printf("n | r| c(n,r)recursive | c(n,r)nonrecursive \n");
394        printf("-----\n");
395        printf("0 | 0 | 1 | 1
396            1 | 0 | 1 | 1
397            1 | 1 | 1 | 1
398            2 | 0 | 4 | 1
399            2 | 1 | 2 | 1
400            2 | 2 | 1 | 1
401            3 | 0 | 36 | 1
402            3 | 1 | 12 | 1
403            3 | 2 | 3 | 1
404            3 | 3 | 1 | 1
405            4 | 0 | 576 | 1
406            4 | 1 | 144 | 1
407            4 | 2 | 24 | 1
408            4 | 3 | 4 | 1
409            4 | 4 | 1 | 1
410            5 | 0 | 14400 | 1
411            5 | 1 | 2880 | 1
412            5 | 2 | 360 | 1
413            5 | 3 | 40 | 1
414            5 | 4 | 5 | 1
415            5 | 5 | 1 | 1
416        );
417        printf("-----\n");
418        printf("n | r| c(n,r)recursive | c(n,r)nonrecursive \n");
419        printf("-----\n");
420        printf("0 | 0 | 1 | 1
421            1 | 0 | 1 | 1
422            1 | 1 | 1 | 1
423            2 | 0 | 4 | 1
424            2 | 1 | 2 | 1
425            2 | 2 | 1 | 1
426            3 | 0 | 36 | 1
427            3 | 1 | 12 | 1
428            3 | 2 | 3 | 1
429            3 | 3 | 1 | 1
430            4 | 0 | 576 | 1
431            4 | 1 | 144 | 1
432            4 | 2 | 24 | 1
433            4 | 3 | 4 | 1
434            4 | 4 | 1 | 1
435            5 | 0 | 14400 | 1
436            5 | 1 | 2880 | 1
437            5 | 2 | 360 | 1
438            5 | 3 | 40 | 1
439            5 | 4 | 5 | 1
440            5 | 5 | 1 | 1
441        );
442        printf("-----\n");
443        printf("n | r| c(n,r)recursive | c(n,r)nonrecursive \n");
444        printf("-----\n");
445        printf("0 | 0 | 1 | 1
446            1 | 0 | 1 | 1
447            1 | 1 | 1 | 1
448            2 | 0 | 4 | 1
449            2 | 1 | 2 | 1
450            2 | 2 | 1 | 1
451            3 | 0 | 36 | 1
452            3 | 1 | 12 | 1
453            3 | 2 | 3 | 1
454            3 | 3 | 1 | 1
455            4 | 0 | 576 | 1
456            4 | 1 | 144 | 1
457            4 | 2 | 24 | 1
458            4 | 3 | 4 | 1
459            4 | 4 | 1 | 1
460            5 | 0 | 14400 | 1
461            5 | 1 | 2880 | 1
462            5 | 2 | 360 | 1
463            5 | 3 | 40 | 1
464            5 | 4 | 5 | 1
465            5 | 5 | 1 | 1
466        );
467        printf("-----\n");
468        printf("n | r| c(n,r)recursive | c(n,r)nonrecursive \n");
469        printf("-----\n");
470        printf("0 | 0 | 1 | 1
471            1 | 0 | 1 | 1
472            1 | 1 | 1 | 1
473            2 | 0 | 4 | 1
474            2 | 1 | 2 | 1
475            2 | 2 | 1 | 1
476            3 | 0 | 36 | 1
477            3 | 1 | 12 | 1
478            3 | 2 | 3 | 1
479            3 | 3 | 1 | 1
480            4 | 0 | 576 | 1
481            4 | 1 | 144 | 1
482            4 | 2 | 24 | 1
483            4 | 3 | 4 | 1
484            4 | 4 | 1 | 1
485            5 | 0 | 14400 | 1
486            5 | 1 | 2880 | 1
487            5 | 2 | 360 | 1
488            5 | 3 | 40 | 1
489            5 | 4 | 5 | 1
490            5 | 5 | 1 | 1
491        );
492        printf("-----\n");
493        printf("n | r| c(n,r)recursive | c(n,r)nonrecursive \n");
494        printf("-----\n");
495        printf("0 | 0 | 1 | 1
496            1 | 0 | 1 | 1
497            1 | 1 | 1 | 1
498            2 | 0 | 4 | 1
499            2 | 1 | 2 | 1
500            2 | 2 | 1 | 1
501            3 | 0 | 36 | 1
502            3 | 1 | 12 | 1
503            3 | 2 | 3 | 1
504            3 | 3 | 1 | 1
505            4 | 0 | 576 | 1
506            4 | 1 | 144 | 1
507            4 | 2 | 24 | 1
508            4 | 3 | 4 | 1
509            4 | 4 | 1 | 1
510            5 | 0 | 14400 | 1
```

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main.c

```
37     printf("invalid input ! r must be <= n and both >= 0,\n");
38     );
39 }
40 printf("\n Results in tabular form:");
41 printf("-----
42     -----");
43 printf("n | r| c(n,r)recursive | c(n,r)nonrecursive \n");
44 printf("-----
45     -----");
46 for (int i = 0 ; i <= n ; i++)
47 {
48     for( int j = 0 ; j <= i ; j++)
49     {
50         printf("%2d | %2d | %8d | %8d \n" , i , j ,
51             binomial_recursive(i,j) ,
52             binomial_nonrecursive(i,j));
53     }
54 }
55 printf("-----
56     -----");
57
58 return 0;
59 }
```

Output

0	0	1	1
1	0	1	1
1	1	1	1
2	0	4	1
2	1	2	1
2	2	1	1
3	0	36	1
3	1	12	1
3	2	3	1
3	3	1	1
4	0	576	1
4	1	144	1
4	2	24	1
4	3	4	1
4	4	1	1
5	0	14400	1
5	1	2880	1
5	2	360	1
5	3	40	1
5	4	5	1
5	5	1	1

==== Code Execution Successful ===

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