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1 March, 2021

CS427

Homework 13

1.

```
sage: def fac(n, otherN):
....:     a = 1
....:     b = -(n+1 -otherN)
....:     c = n
....:     return solve(a*x^2 + b*x + c==0, x)
....:
sage: fac(133140272889335192922108409260662174476303831652383671688547009484253235940586917140482669182256368285260992829447207980183170174867620358952230969986447559330583492429636627298640338596
....: 53189455654601311315434682321227174892785964799453458613355321802298384810842146544208991909061054234476829448172510375722242191711597106302680658714128758703726515065366909432311668657453655
....: 58866591647361053311046516013069669036866734126558017744393751161611219195769578488559882902397248309033911661475005854696820021069072502248533328754832698616238405221381252145137439919090800
....: 00859552743893827218449566611138745095472005761807,133140272889335192922108409260662174476303831652383671688547009484253235940586917140482669182256368285260992829447207980183170174867620358
....: 52230969986447559330583492429636627298640338596531894556546013113154346823212271748927859647994534586133553218022983848108421465442089919090610542344768294481725103757224219171159710630268065871412875870372651506536690943231166865745365
....: 76352567722273701090667853120965897796223554954190060499745678951896873181104980586923156308566936720693205290623996815635903820151773229097447493307026079314281541837265520045272019562263960
....: 83550034677906249425963898319117891502783513452775160701785906451173152044029818168601788850286800)
[x == 2902438727411237149321770440074913132706621372724496935081916661647403063677780122628568074109520952211926749332356451506794840053836669438315707733139611590473974075029785891399129419203567871885282377890504006250292732247831839524843640485185435131491053818481499939154108103507089729236213797011631172581, x == 4587186342020958658987181444440446534449462495632500798255147557393736796863892670529553285088381619398417801770913412838880233168262517154475101865077266655252911748680472389738752659635291496131259492655518130242961753671721904620738757575780787280592902453852848317376210106606346491092071443828148956054 7]
sage:
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2.

```
sage: def p2(n, d):
....:     for i in range(d):
....:         m = solve(x^2 - i*x - n == 0, x)
....:         a1 = m[0].rhs()
....:         a2 = m[1].rhs()
....:         if (a1.is_integer() == true and is_prime(a1)):
....:             print(a1)
....:             print(n / a1)
....:             break
....:         if (a2.is_integer() == true and is_prime(a2)):
....:             print(a2)
....:             print(n / a2)
....:             break
```

This approach finds the first prime integer factor of n, then divides in by that factor to find the other factor. The quadratic equation is used here because it gives two values that satisfy the condition that $x^2 – i*x = n$.