

```

> h := n2 + n + 41 :
> f:=proc(y)
  description "factors the substitution of the epression into n^2+n + 41";
  factor(y2 + y + 41);
end proc;
f:=proc(y)
  description "factors the substitution of the epression into n^2+n + 41";
  factor(y2 + y + 41)
end proc
=
>
> # Small equation coeffieients doublecheck
>
> #The question I am attempting to answer in this project is – what integer values of n cause
  h(n) to be a composite number, and by extention, when is h(n) prime.
> # r is for row and c is for column. So y[r,c] is a composition of functions h( y[r,c]).
> # when y[r,c] is carefully chosen, it makes y[r,c] algebraically. This means that y[r,c] is the
  product of two integers, neither of which is 1 or -1, and thus y[r, c] is composite
> # I am pretty sure that any n below a threshold lies on one of the lines described by the
  expressions below.
=
>
>
> y[1, 1] := z :
  x[1, 1] := f(%);
                                     x1,1 := z2 + z + 41
=
> y[1, 2] := z2 + 40 :
  x[1, 2] := f(%);
                                     x1,2 := (z2 + z + 41) (z2 - z + 41)
=
> y[2, 1] := 2 z2 + z + 81 :
  x[2, 1] := f(%);
                                     x2,1 := (4 z2 + 163) (z2 + z + 41)
=
> y[3, 1] := 3 z2 + 2 z + 122 :
  x[3, 1] := f(%);
                                     x3,1 := (z2 + z + 41) (9 z2 + 3 z + 367)
=
> y[3, 2] := 6 z2 + z + 244 :
  x[3, 2] := f(%);
                                     x3,2 := (4 z2 + 163) (9 z2 + 3 z + 367)
=
> y[4, 1] := 4 z2 + 3 z + 163 :
  x[4, 1] := f(%);
                                     x4,1 := (16 z2 + 8 z + 653) (z2 + z + 41)
=
> y[4, 3] := 12 z2 + 5 z + 489 :
  x[4, 3] := f(%);

```

(1)

(2)

(3)

(4)

(5)

(6)

(7)

(8)

$$x_{4,3} := (16z^2 + 8z + 653)(9z^2 + 3z + 367) \quad (8)$$

$$\begin{aligned} > y[5,1] := 5z^2 + 4z + 204 : \\ x[5,1] := f(\%); \end{aligned}$$

$$x_{5,1} := (z^2 + z + 41)(25z^2 + 15z + 1021) \quad (9)$$

$$\begin{aligned} > y[5,2] := 10z^2 + z + 407 : \\ x[5,2] := f(\%); \end{aligned}$$

$$x_{5,2} := (4z^2 + 163)(25z^2 + 5z + 1019) \quad (10)$$

$$\begin{aligned} > y[5,3] := 15z^2 + 4z + 611 : \\ x[5,3] := f(\%); \end{aligned}$$

$$x_{5,3} := (25z^2 + 5z + 1019)(9z^2 + 3z + 367) \quad (11)$$

$$\begin{aligned} > y[5,4] := 20z^2 + 11z + 816 : \\ x[5,4] := f(\%); \end{aligned}$$

$$x_{5,4} := (16z^2 + 8z + 653)(25z^2 + 15z + 1021) \quad (12)$$

$$\begin{aligned} > y[6,1] := 6z^2 + 5z + 245 : \\ x[6,1] := f(\%); \end{aligned}$$

$$x_{6,1} := (z^2 + z + 41)(36z^2 + 24z + 1471) \quad (13)$$

$$\begin{aligned} > y[6,5] := 30z^2 + 19z + 1225 : \\ x[6,5] := f(\%); \end{aligned}$$

$$x_{6,5} := (36z^2 + 24z + 1471)(25z^2 + 15z + 1021) \quad (14)$$

$$\begin{aligned} > y[7,1] := 7z^2 + 6z + 286 : \\ x[7,1] := f(\%); \end{aligned}$$

$$x_{7,1} := (z^2 + z + 41)(49z^2 + 35z + 2003) \quad (15)$$

$$\begin{aligned} > y[7,2] := 14z^2 + z + 570 : \\ x[7,2] := f(\%); \end{aligned}$$

$$x_{7,2} := (4z^2 + 163)(49z^2 + 7z + 1997) \quad (16)$$

$$\begin{aligned} > y[7,3] := 21z^2 + 8z + 856 : \\ x[7,3] := f(\%); \end{aligned}$$

$$x_{7,3} := (9z^2 + 3z + 367)(49z^2 + 21z + 1999) \quad (17)$$

$$\begin{aligned} > y[7,4] := 28z^2 + 13z + 1142 : \\ x[7,4] := f(\%); \end{aligned}$$

$$x_{7,4} := (49z^2 + 21z + 1999)(16z^2 + 8z + 653) \quad (18)$$

$$\begin{aligned} > y[7,5] := 35z^2 + 6z + 1426 : \\ x[7,5] := f(\%); \end{aligned}$$

$$x_{7,5} := (25z^2 + 5z + 1019)(49z^2 + 7z + 1997) \quad (19)$$

$$\begin{aligned} > y[7,6] := 42z^2 + 29z + 1716 : \\ x[7,6] := f(\%); \end{aligned}$$

$$x_{7,6} := (49z^2 + 35z + 2003)(36z^2 + 24z + 1471) \quad (20)$$

$$\begin{aligned}
&> \\
&> y[8, 1] := 8z^2 + 7z + 327 : \\
& \quad x[8, 1] := f(\%); \\
& \qquad \qquad \qquad x_{8,1} := (64z^2 + 48z + 2617)(z^2 + z + 41) \tag{21}
\end{aligned}$$

$$\begin{aligned}
&> y[8, 3] := 24z^2 + 7z + 978 : \\
& \quad x[8, 3] := f(\%); \\
& \qquad \qquad \qquad x_{8,3} := (64z^2 + 16z + 2609)(9z^2 + 3z + 367) \tag{22}
\end{aligned}$$

$$\begin{aligned}
&> y[8, 5] := 40z^2 + 9z + 1630 : \\
& \quad x[8, 5] := f(\%); \\
& \qquad \qquad \qquad x_{8,5} := (64z^2 + 16z + 2609)(25z^2 + 5z + 1019) \tag{23}
\end{aligned}$$

$$\begin{aligned}
&> y[8, 7] := 56z^2 + 41z + 2289 : \\
& \quad x[8, 7] := f(\%); \\
& \qquad \qquad \qquad x_{8,7} := (49z^2 + 35z + 2003)(64z^2 + 48z + 2617) \tag{24}
\end{aligned}$$

$$\begin{aligned}
&> \\
&> y[9, 1] := 9z^2 + 8z + 368 : \\
& \quad x[9, 1] := f(\%); \\
& \qquad \qquad \qquad x_{9,1} := (z^2 + z + 41)(81z^2 + 63z + 3313) \tag{25}
\end{aligned}$$

$$\begin{aligned}
&> y[9, 2] := 18z^2 + z + 733 : \\
& \quad x[9, 2] := f(\%); \\
& \qquad \qquad \qquad x_{9,2} := (81z^2 + 9z + 3301)(4z^2 + 163) \tag{26}
\end{aligned}$$

$$\begin{aligned}
&> y[9, 4] := 36z^2 + 19z + 1469 : \\
& \quad x[9, 4] := f(\%); \\
& \qquad \qquad \qquad x_{9,4} := (16z^2 + 8z + 653)(81z^2 + 45z + 3307) \tag{27}
\end{aligned}$$

$$\begin{aligned}
&> y[9, 5] := 45z^2 + 26z + 1837 : \\
& \quad x[9, 5] := f(\%); \\
& \qquad \qquad \qquad x_{9,5} := (81z^2 + 45z + 3307)(25z^2 + 15z + 1021) \tag{28}
\end{aligned}$$

$$\begin{aligned}
&> y[9, 7] := 63z^2 + 8z + 2567 : \\
& \quad x[9, 7] := f(\%); \\
& \qquad \qquad \qquad x_{9,7} := (81z^2 + 9z + 3301)(49z^2 + 7z + 1997) \tag{29}
\end{aligned}$$

$$\begin{aligned}
&> y[9, 8] := 72z^2 + 55z + 2944 : \\
& \quad x[9, 8] := f(\%); \\
& \qquad \qquad \qquad x_{9,8} := (81z^2 + 63z + 3313)(64z^2 + 48z + 2617) \tag{30}
\end{aligned}$$

$$\begin{aligned}
&> \\
&> y[10, 1] := 10z^2 + 9z + 409 : \\
& \quad x[10, 1] := f(\%); \\
& \qquad \qquad \qquad x_{10,1} := (100z^2 + 80z + 4091)(z^2 + z + 41) \tag{31}
\end{aligned}$$

$$\begin{aligned}
&> y[10, 3] := 30z^2 + 11z + 1223 : \\
& \quad x[10, 3] := f(\%); \\
& \tag{32}
\end{aligned}$$

$$x_{10,3} := (9z^2 + 3z + 367) (100z^2 + 40z + 4079) \quad (32)$$

$$\begin{aligned} > y[10,7] := 70z^2 + 29z + 2855 : \\ x[10,7] := f(\%); \end{aligned}$$

$$x_{10,7} := (100z^2 + 40z + 4079) (49z^2 + 21z + 1999) \quad (33)$$

$$\begin{aligned} > y[10,9] := 90z^2 + 71z + 3681 : \\ x[10,9] := f(\%); \end{aligned}$$

$$x_{10,9} := (100z^2 + 80z + 4091) (81z^2 + 63z + 3313) \quad (34)$$

>

$$\begin{aligned} > y[11,1] := 11z^2 + 10z + 450 : \\ x[11,1] := f(\%); \end{aligned}$$

$$x_{11,1} := (z^2 + z + 41) (121z^2 + 99z + 4951) \quad (35)$$

$$\begin{aligned} > y[11,2] := 22z^2 + z + 896 : \\ x[11,2] := f(\%); \end{aligned}$$

$$x_{11,2} := (121z^2 + 11z + 4931) (4z^2 + 163) \quad (36)$$

$$\begin{aligned} > y[11,3] := 33z^2 + 10z + 1345 : \\ x[11,3] := f(\%); \end{aligned}$$

$$x_{11,3} := (9z^2 + 3z + 367) (121z^2 + 33z + 4933) \quad (37)$$

$$\begin{aligned} > y[11,4] := 44z^2 + 21z + 1795 : \\ x[11,4] := f(\%); \end{aligned}$$

$$x_{11,4} := (16z^2 + 8z + 653) (121z^2 + 55z + 4937) \quad (38)$$

$$\begin{aligned} > y[11,5] := 55z^2 + 34z + 2246 : \\ x[11,5] := f(\%); \end{aligned}$$

$$x_{11,5} := (25z^2 + 15z + 1021) (121z^2 + 77z + 4943) \quad (39)$$

$$\begin{aligned} > y[11,6] := 66z^2 + 43z + 2696 : \\ x[11,6] := f(\%); \end{aligned}$$

$$x_{11,6} := (36z^2 + 24z + 1471) (121z^2 + 77z + 4943) \quad (40)$$

$$\begin{aligned} > y[11,7] := 77z^2 + 34z + 3141 : \\ x[11,7] := f(\%); \end{aligned}$$

$$x_{11,7} := (121z^2 + 55z + 4937) (49z^2 + 21z + 1999) \quad (41)$$

$$\begin{aligned} > y[11,8] := 88z^2 + 23z + 3587 : \\ x[11,8] := f(\%); \end{aligned}$$

$$x_{11,8} := (64z^2 + 16z + 2609) (121z^2 + 33z + 4933) \quad (42)$$

$$\begin{aligned} > y[11,9] := 99z^2 + 10z + 4034 : \\ x[11,9] := f(\%); \end{aligned}$$

$$x_{11,9} := (121z^2 + 11z + 4931) (81z^2 + 9z + 3301) \quad (43)$$

$$\begin{aligned} > y[11,10] := 110z^2 + 89z + 4500 : \\ x[11,10] := f(\%); \end{aligned}$$

$$x_{11,10} := (121z^2 + 99z + 4951) (100z^2 + 80z + 4091) \quad (44)$$

$$\begin{aligned}
& \text{>} \\
& \text{>} \quad y[12, 1] := 12 z^2 + 11 z + 491 : \\
& \quad x[12, 1] := f(\%); \\
& \quad \quad x_{12, 1} := (z^2 + z + 41) (144 z^2 + 120 z + 5893) \tag{45}
\end{aligned}$$

$$\begin{aligned}
& \text{>} \quad y[12, 5] := 60 z^2 + 11 z + 2445 : \\
& \quad x[12, 5] := f(\%); \\
& \quad \quad x_{12, 5} := (25 z^2 + 5 z + 1019) (144 z^2 + 24 z + 5869) \tag{46}
\end{aligned}$$

$$\begin{aligned}
& \text{>} \quad y[12, 7] := 84 z^2 + 13 z + 3423 : \\
& \quad x[12, 7] := f(\%); \\
& \quad \quad x_{12, 7} := (144 z^2 + 24 z + 5869) (49 z^2 + 7 z + 1997) \tag{47}
\end{aligned}$$

$$\begin{aligned}
& \text{>} \quad y[12, 11] := 132 z^2 + 109 z + 5401 : \\
& \quad x[12, 11] := f(\%); \\
& \quad \quad x_{12, 11} := (121 z^2 + 99 z + 4951) (144 z^2 + 120 z + 5893) \tag{48}
\end{aligned}$$

$$\begin{aligned}
& \text{>} \\
& \text{>} \quad y[13, 1] := 13 z^2 + 12 z + 532 : \\
& \quad x[13, 1] := f(\%); \\
& \quad \quad x_{13, 1} := (169 z^2 + 143 z + 6917) (z^2 + z + 41) \tag{49}
\end{aligned}$$

$$\begin{aligned}
& \text{>} \quad y[13, 2] := 26 z^2 + z + 1059 : \\
& \quad x[13, 2] := f(\%); \\
& \quad \quad x_{13, 2} := (169 z^2 + 13 z + 6887) (4 z^2 + 163) \tag{50}
\end{aligned}$$

> # 11-1-2016 M. A.