Example use of EDSTools

Load the script.

```
attach('edstools.sage')
```

Create an elliptic divisibility sequence from the initial four terms.

```
eds = EDS([1,2,5,6]); eds
```

An elliptic divisibility sequence with first terms 1, 2, 5, 6

Display terms or a given term. The computation of term \( m \) takes \( \log m \) time, using a double-and-add approach (Shipsey).

```
eds.terms(5)
```

\[ [0, 1, 2, 5, 6, -77] \]

```
eds.term(5)
```

-77

```
eds.term(70)
```

\[ 92124760843887794079179716866846893954918287393982924043772016333\]
\[ 6561417337770169776447023887405569817468470693057509451462096495396\]
\[ 1535846508898205625945008306867454732296183586525062861979168754744\]
\[ 553213546093275864942190937026583982069697599889993558271148334336\]
\[ 59407598324079467556232328691611705857480612168387037463098136534229\]
\[ 399787255794486639259189232928801545945623731314344607835320798 \]

Check for the rank (i.e. the first zero) up to a given bound. This sequence has infinite rank (no zeroes).

```
eds.rank(100)
```

'Rank not found'

Find a curve and point that correspond to the sequence. You can ask just for given coefficients using functions \( a, b, c \) (usual Weierstrass coefficients).

```
curve = eds.curve(); curve
```

\[ [9/10, 39/20, 2, 1, 0] \]

```
eds.a(2)
```

39/20

```
point = eds.point(); point
```

\[ [0, 0] \]

You can also create a sequence from a curve and point. If we use the curve and point we got above, we get back the original sequence.

```
eds
```

An elliptic divisibility sequence with first terms 1, 2, 5, 6

```
edstwo = EDS(curve, point); edstwo
```

An elliptic divisibility sequence with first terms 1, 2, 5, 6
You can ask for j-invariant and discriminant.

```python
eds.j_invariant()  
4972104743956839/63788500000000
```

```python
E = EllipticCurve(curve); E.j_invariant()  
4972104743956839/63788500000000
```

You can create a sequence from twice the point, directly or using the function `subsequence`.

```python
P = E(point); 2*P  
(-5/4 : -1/4 : 1)
```

```python
edsthree = EDS(E, 2*P); edsthree  
An elliptic divisibility sequence with first terms 1, 3/8, -215/128, -50037/32768
```

```python
edssub = eds.subsequence(2); edssub  
An elliptic divisibility sequence with first terms 1, 3/8, -215/128, -50037/32768
```

You can take an equivalent sequence (i.e. scale by \(a^{(n^2-1)}\)).

```python
eds  
An elliptic divisibility sequence with first terms 1, 2, 5, 6
```

```python
eds.equivalent(2)  
An elliptic divisibility sequence with first terms 1, 16, 1280, 196608
```