Problem 2

Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be:

1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...

By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Solution

Using built-in functions:

In[40]:=
```
{Fibonacci[33], Fibonacci[34]}
```

Out[40]=
```
{3 524 578, 5 702 887}
```

In[42]:=
```
Select[Fibonacci[Range[33]], EvenQ] // Total
```

Out[42]=
```
4 613 732
```

Being a bit more cunning, we note that in mod 2, the Fibonnaci sequence is 1,1,0,1,1,0, so the even terms are precisely those in positions 3,6,9,

In[43]:=
```
Fibonacci[Range[3, 33, 3]] // Total
```

Out[43]=
```
4 613 732
```

We can avoid “cheating”, by defining the Fibonacci function properly:

In[63]:=
```
fib[n_] := fib[n] = fib[n - 1] + fib[n - 2]
fib[1] = 1;
fib[2] = 1;
SetAttributes[fib, Listable];
```

In[62]:=
```
fib[Range[3, 33, 3]] // Total
```

Out[62]=
```
4 613 732
```