Project Euler P0002

Method 1
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In[9]:=
```
(* Test out the function *)
Table[Fibonacci[i], {i, 0, 10}]
```

Out[9]=
```
{0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55}
```

```
(* Find when fibnocci sequence passes 4 million *)
endFinder[x_] :=
If[Fibonacci[x] > 4 000 000 , Print[x , ", ", Fibonacci[x]], endFinder[x + 1]]

endFinder[0]
```

```
34 , 5 702 887
```

From this, it is clear that the 35th element in the sequence passes 4 million. Put another way, when you plug in 34 into the Fibonacci function it'll yield a number greater than 4 million.

In[23]:=
```
oddToZero[x_] :=
If[Mod[x, 2] ≠ 0, 0, x]
```

```
Total[oddToZero /@ (Table[Fibonacci[i], {i, 2, 33}])]
```

Out[24]=
```
4 613 732
```

Additional analysis.

In[25]:=
```
oddToZero /@ (Table[Fibonacci[i], {i, 2, 33}])
```

Out[25]=
```
{0, 2, 0, 0, 8, 0, 0, 34, 0, 0, 144, 0, 0, 610, 0, 0, 2584, 0,
  0, 10 946, 0, 0, 46 368, 0, 0, 196 418, 0, 0, 832 040, 0, 0, 3 524 578 }
```

Unsurprisingly, every three numbers is an even number. Prepare yourself for a pathetically unprofessional inductive proof.

START
In natural language, We start with an even and odd number. Those
odd, even, _ , _, _

An even + odd number is odd.
odd, even, odd, _, _

Again, an even + odd number will yield an odd number.
odd, even, odd, odd, _

Two odds, odd + odd, will yield an even
odd, even, odd, odd, even

And the pattern begins again.
END