```mathematica
d[e[n_]] := d[e[n]] = Total[f /@ (n - Most@NestWhileList[NextPrime, 2, # < n &])]
```

```mathematica
d[e[100]]
```

```
f[3] + f[11] + f[17] + f[21] + f[27] + f[29] + f[33] +
  f[39] + f[41] + f[47] + f[53] + f[57] + f[59] + f[63] + f[69] + f[71] +
  f[77] + f[81] + f[83] + f[87] + f[89] + f[93] + f[95] + f[97] + f[98]
```

```mathematica
d /@ Array[e, {1000}];
```

```mathematica
Timing[d /@ Array[e, {1000}];]
```

```
{0., Null}
```

```mathematica
Timing[Total[d /@ Array[e, {1000}]];]
```

```
{0.156001, Null}
```

```mathematica
Timing[t0 = Sum[Round@Log[k] e[k], {k, 1000}] /. e[n_] :> d[e[n]];]
```

```
{0.062400, Null}
```

```mathematica
Timing[t0 = Expand[t0];]
```

```
{64.007210, Null}
```

```mathematica
Timing[t1 = Expand[Sum[Round@Log[k] e[k], {k, 1000}] /. e[n_] :> d[e[n]]];]
```

```
{48.625512, Null}
```

```mathematica
t0 == t1
```

```
True
```

```mathematica
Timing[t2 = Sum[Expand[Round@Log[k] d[e[k]]], {k, 1000}];]
```

```
{0.499203, Null}
```

```mathematica
t1 == t2
```

```
True
```

```mathematica
Timing[
  t3 = Total[Expand /@ (Table[Round@Log[k] e[k], {k, 1000}] /. e[n_] :> d[e[n]])];]
```

```
{0.436803, Null}
```

```mathematica
t2 == t3
```

```
True
```