Problem 3: The Sage Zone

UW Student who knows SageTex!
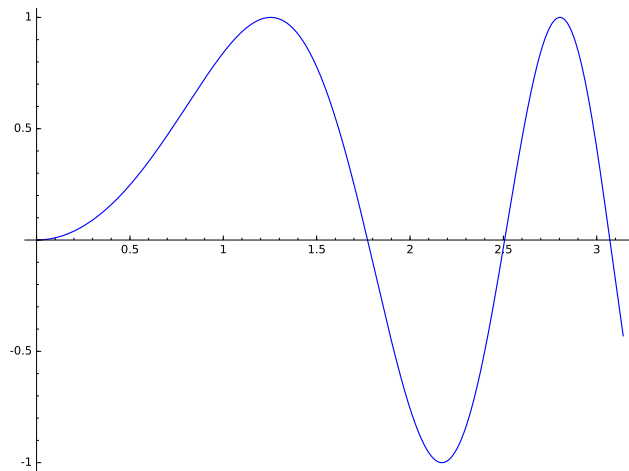
2016-04-22

1 Factoring Years

Sage says[1] that $2016 = 2^5 \cdot 3^2 \cdot 7$ and $2017 = 2017$.

2 Plotting a Function

Here is a plot of $\sin(x^2)$ made using sagetex. Your plot should be about this size (not enormous).

3 Deriving a Formula

Sage can find a formula for $f(n) = \sin(1) + \sin(2) + \cdots + \sin(n)$. Just enter this code into Sage (in sagetex use the sageblock environment):

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[1]These factorization are computed using sagetex!

```
var('k, n')
f = sum(sin(k), k, 1, n)
```
and find that

$$f = \frac{\cos\left(n\arctan\left(\frac{\sin(1)}{\cos(1)}\right) + \arctan\left(\frac{\sin(1)}{\cos(1)}\right)\right)\sin(1) - (\cos(1) - 1)\sin\left(n\arctan\left(\frac{\sin(1)}{\cos(1)}\right) + \arctan\left(\frac{\sin(1)}{\cos(1)}\right)\right) - \sin(1)}{2(\cos(1) - 1)}$$

Here is a plot of the formula above from 0 to 100: