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> restart: with(LinearAlgebra) :
> inproduct := (f, g)→int(conjugate(f)·g, t = -Pi..Pi) :
> NORM := f→sqrt(inproduct(f, f)) :
> simplify(NORM(1))

$$\sqrt{2} \sqrt{\pi} \quad (1)$$

> assume(k, 'integer');
simplify(NORM(cos(k·t)), symbolic);

$$\sqrt{\pi} \quad (2)$$

> simplify(NORM(sin(k·t)), symbolic);

$$\sqrt{\pi} \quad (3)$$

> # ii
> t1 := inproduct(1/sqrt(2 Pi), t^2)

$$t1 := \frac{\sqrt{2} \pi^{5/2}}{3} \quad (4)$$

> t2 := simplify(inproduct(cos(k·t)/sqrt(Pi), t^2), symbolic)

$$t2 := \frac{4 \sqrt{\pi} (-1)^{k\sim}}{k\sim^2} \quad (5)$$

> simplify(inproduct(sin(k·t)/sqrt(Pi), t^2), symbolic)

$$0 \quad (6)$$

> f0 := simplify(t1 + t2)

$$f0 := \frac{\sqrt{\pi} (\sqrt{2} \pi^2 k\sim^2 + 12 (-1)^{k\sim})}{3 k\sim^2} \quad (7)$$

> distance := simplify(inproduct(t^2, t^2)^2 - 2·inproduct(t^2, f0) + inproduct(f0, f0)^2, symbolic)

$$\begin{aligned} distance := \frac{1}{81 k\sim^8} & \left( 16 \left( -\frac{9 \pi^{5/2} \sqrt{2} k\sim^8}{4} - 27 (-1)^{k\sim} k\sim^6 \sqrt{\pi} \right. \right. \\ & + \left( 24 \pi^2 (-1)^{k\sim} k\sim^2 (\pi^4 k\sim^4 + 72) \sqrt{2} + 5184 + \left( \pi^8 + \frac{81}{100} \pi^6 \right) k\sim^8 \right. \\ & \left. \left. + 432 \pi^4 k\sim^4 \right) \pi \right) \pi^3 \end{aligned} \quad (8)$$

> limit(distance, k = infinity)

$$\frac{16 \pi^{12}}{81} + \frac{4 \pi^{10}}{25} - \frac{4 \sqrt{2} \pi^{11/2}}{9} \quad (9)$$

> eval(distance, k = 100000); # we can see it going to null

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[illegible]