

IMAP² Fairfield , IA

Trig Function Explorations

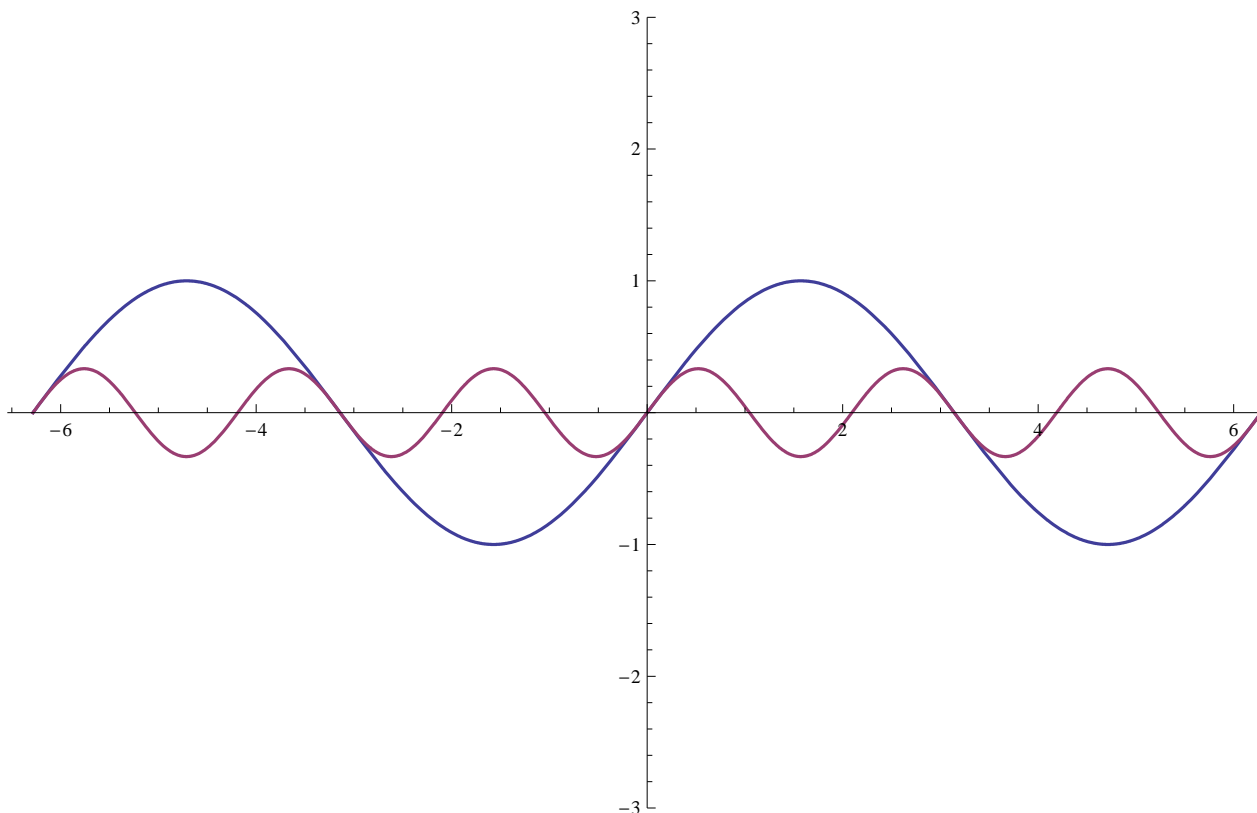
June 2008 Notes by WS

EXAMPLE 1

- The graphic below shows the two curves
 $y_1 = \sin[x]$ and
 $y_2 = (1/3) \sin[3x]$
 $x \in [-2\pi, 2\pi]$, $y \in [-3, 3]$.

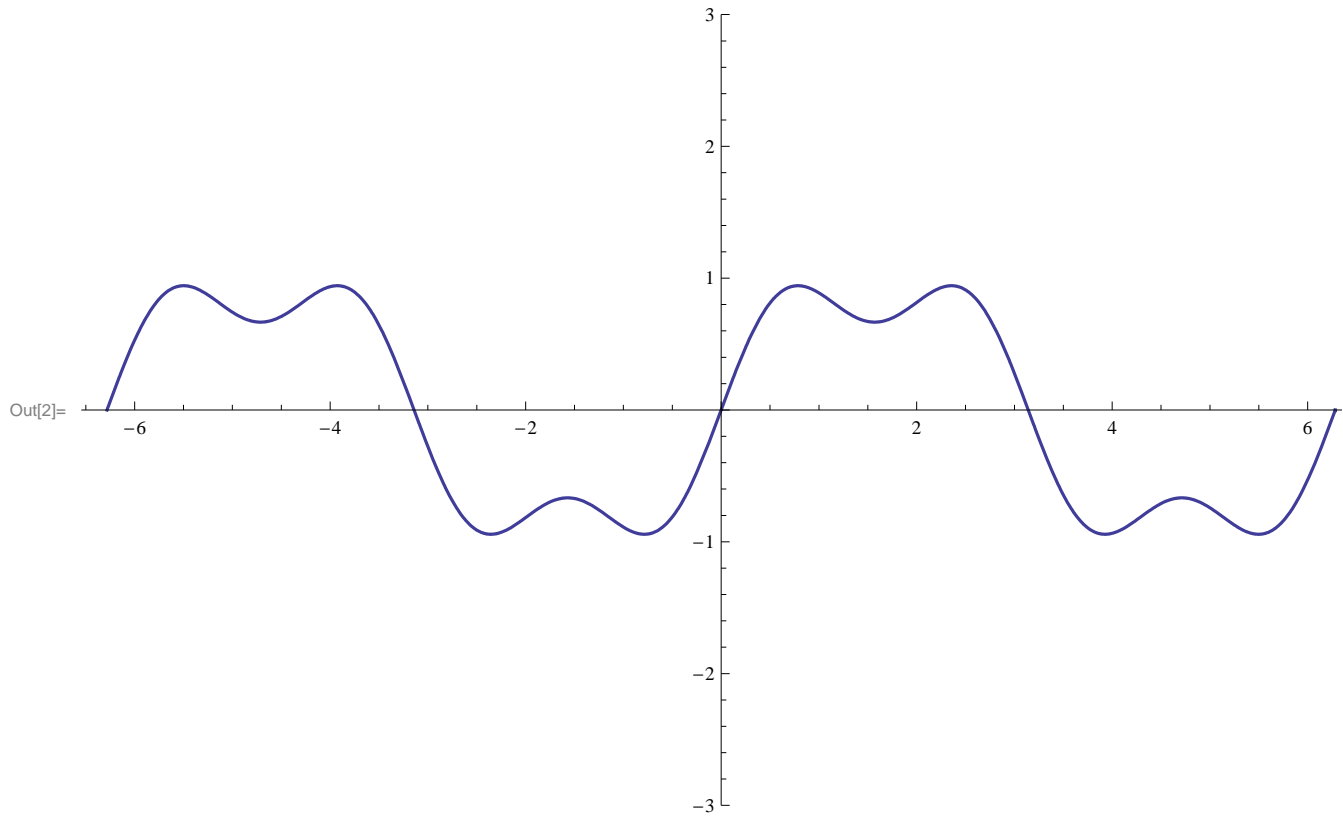
QUESTION: what does the curve $y_1 + y_2$ look like? See next cell for an answer.

```
Plot[{Sin[x], (1/3) Sin[3*x]}, {x, -2 Pi, 2 Pi},  
PlotRange -> {-3, 3}, PlotStyle -> {Thickness[.0025]}, ImageSize -> 600]
```

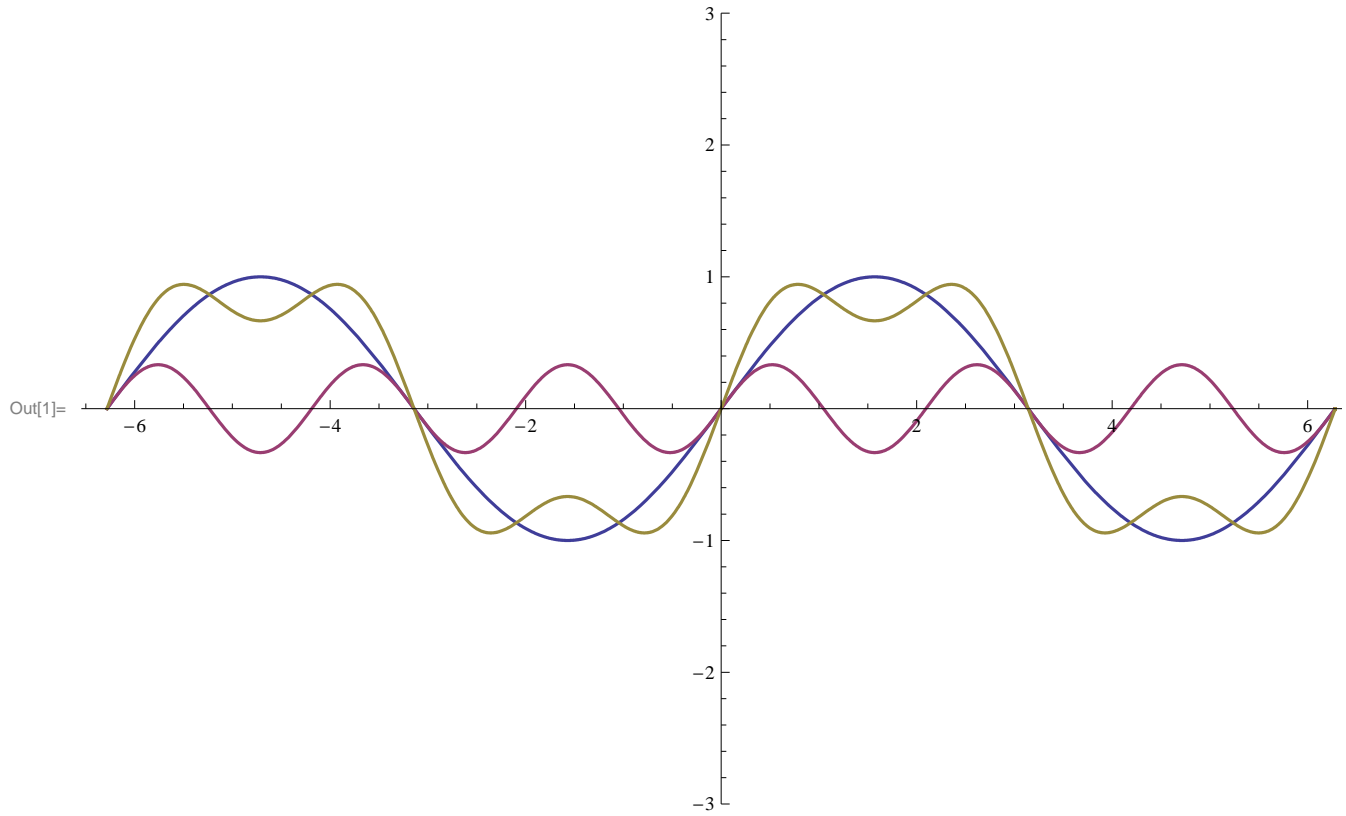


- $y_1 = \sin[x]$ and
 $y_2 = (1/3) \sin[3x]$
 $x \in [-2\pi, 2\pi]$, $y \in [-3, 3]$.
ANSWER: $y_1 + y_2$ looks like this:

```
In[2]:= Plot[{Sin[x] + (1 / 3) Sin[3 * x]}, {x, -2 Pi, 2 Pi},  
PlotRange -> {-3, 3}, PlotStyle -> {Thickness[.0025]}, ImageSize -> 600]
```



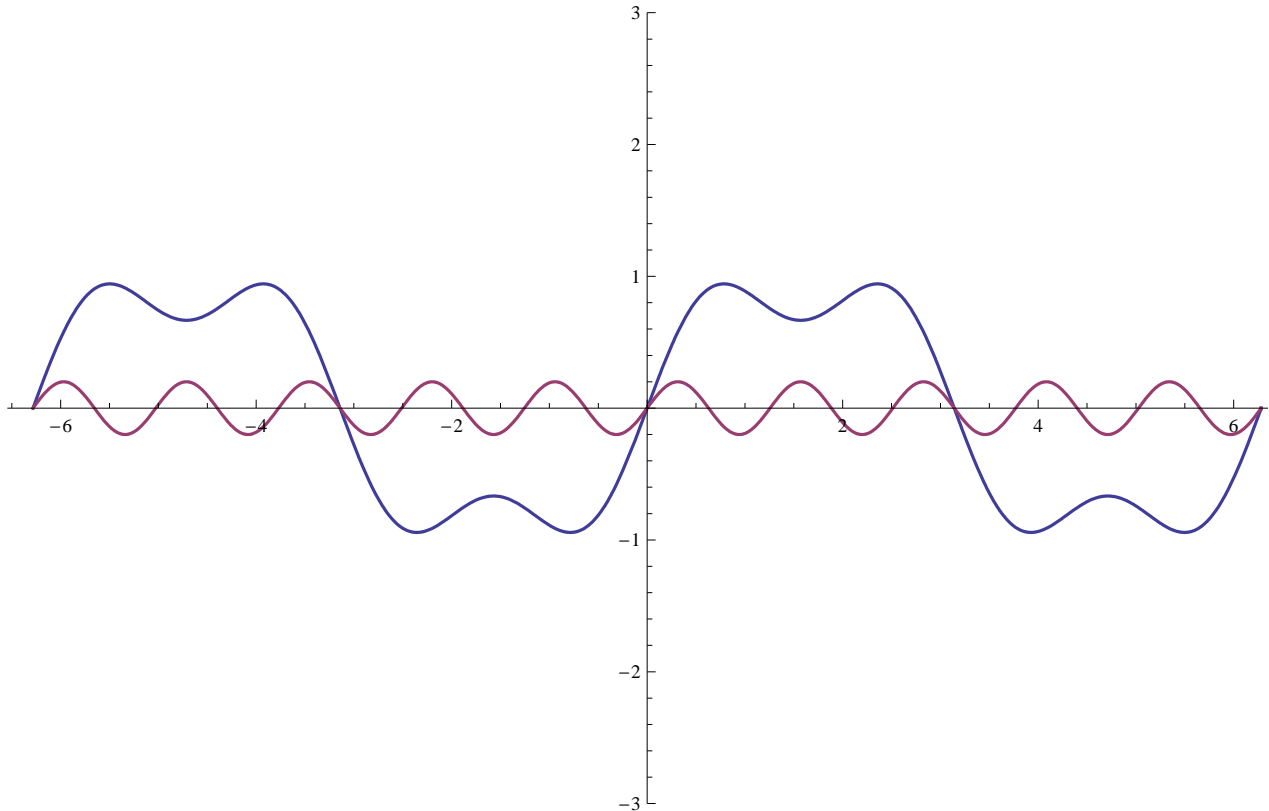
```
In[1]:= Plot[{Sin[x], (1/3) Sin[3*x], Sin[x] + (1/3) Sin[3*x]}, {x, -2 Pi, 2 Pi},  
PlotRange -> {-3, 3}, PlotStyle -> {Thickness[.0025]}, ImageSize -> 600]
```



- The graphic below shows the curves
 $(y_1 = \sin[x]) + (y_2 = (1/3) \sin[3x])$
 $y_3 = (1/5) \sin[5x]$
 $x \in [-2\pi, 2\pi], y \in [-3, 3]$.

QUESTION: what does the curve $y_1 + y_2 + y_3$ look like?

```
Plot[{Sin[x] + (1/3) Sin[3*x], (1/5) Sin[5*x]}, {x, -2 Pi, 2 Pi},
PlotRange -> {-3, 3}, PlotStyle -> {Thickness[.0025]}, ImageSize -> 600]
```



```
Plot[{Sin[x], (1/3) Sin[3*x], (1/5) Sin[5*x]}, {x, -2 Pi, 2 Pi},
PlotRange -> {-3, 3}, PlotStyle -> {Thickness[.0025]}, ImageSize -> 600]
```

EXAMPLE 2

- The graphic below shows the two curves

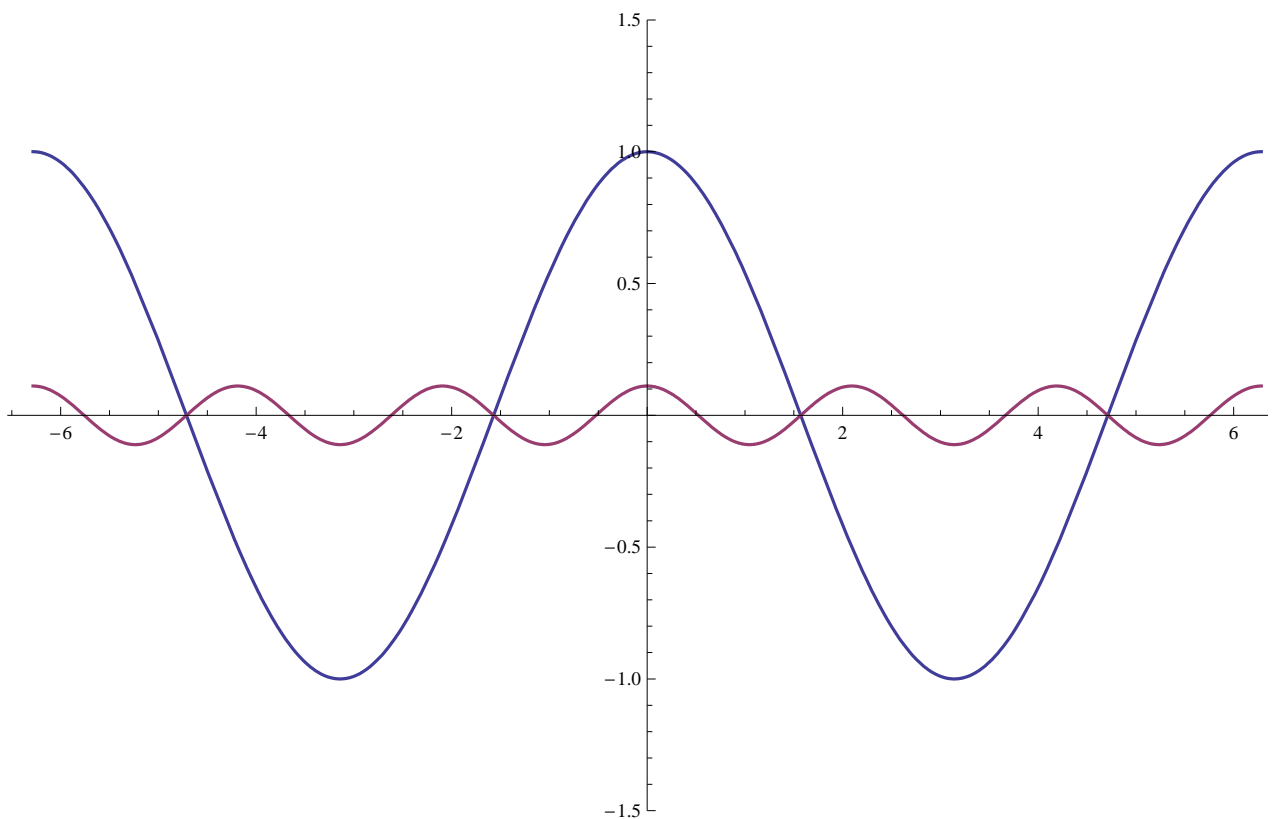
$$y_1 = \cos[x] \text{ and}$$

$$y_2 = (1/3^2) \cos[3x]$$

$$x \in [-2\pi, 2\pi], y \in [-3, 3].$$

QUESTION: what does the curve $y_1 + y_2$ look like? See next cell for an answer.

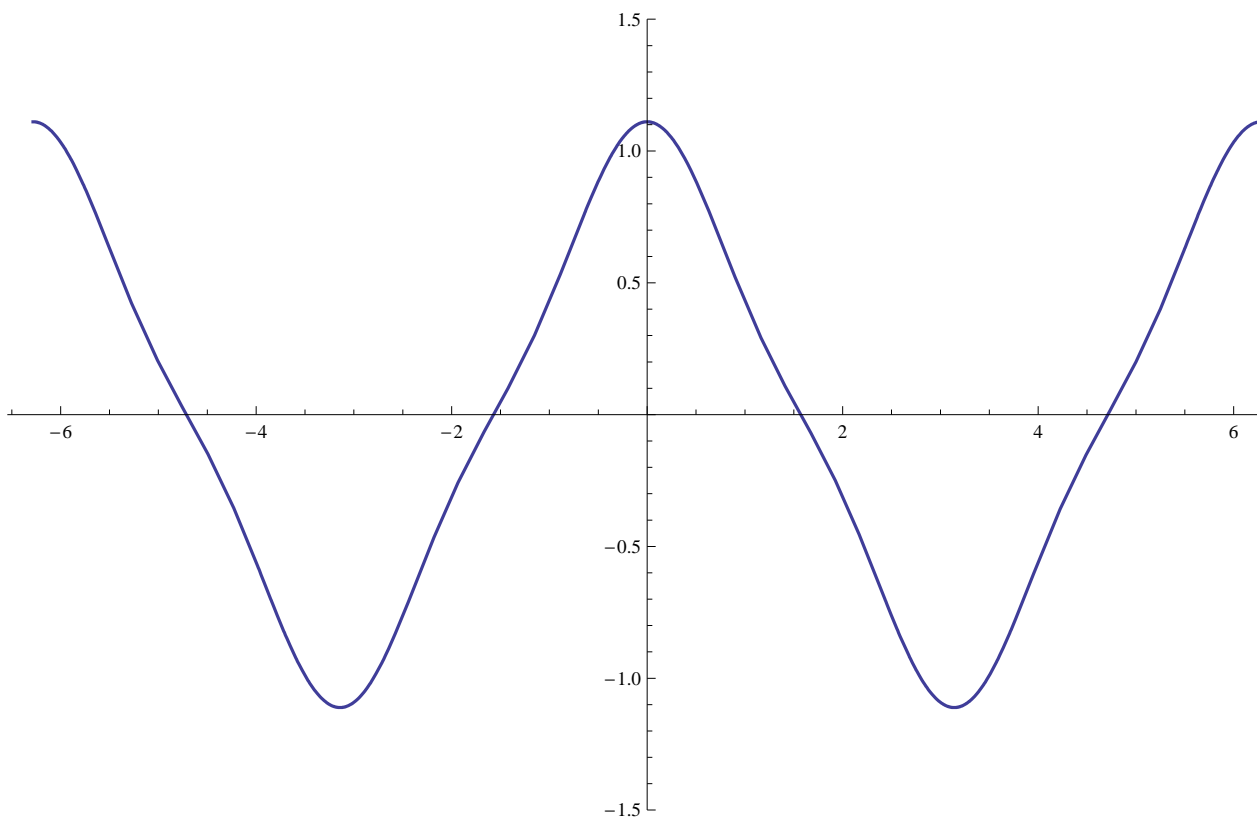
```
Plot[{Cos[x], (1/3^2) Cos[3*x]}, {x, -2 Pi, 2 Pi},
PlotRange -> {-1.5, 1.5}, PlotStyle -> {Thickness[.0025]}, ImageSize -> 600]
```



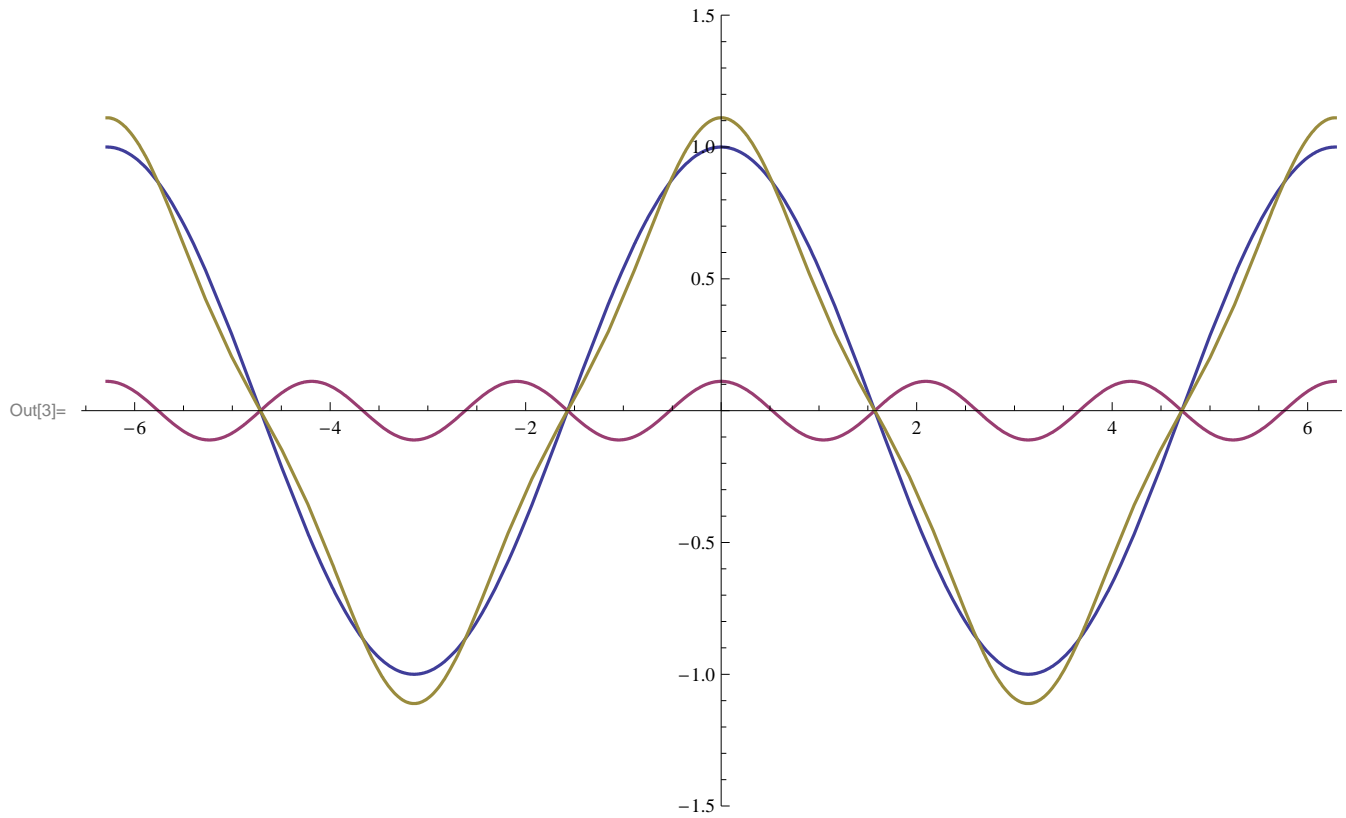
- $y_1 = \cos[x]$ and
 $y_2 = (1/3^2) \cos[3x]$
 $x \in [-2\pi, 2\pi], y \in [-3, 3].$

ANSWER: $y_1 + y_2$ looks like this:

```
Plot[{Cos[x] + (1 / 3^2) Cos[3 * x]}, {x, -2 Pi, 2 Pi},  
PlotRange -> {-1.5, 1.5}, PlotStyle -> {Thickness[.0025]}, ImageSize -> 600]
```



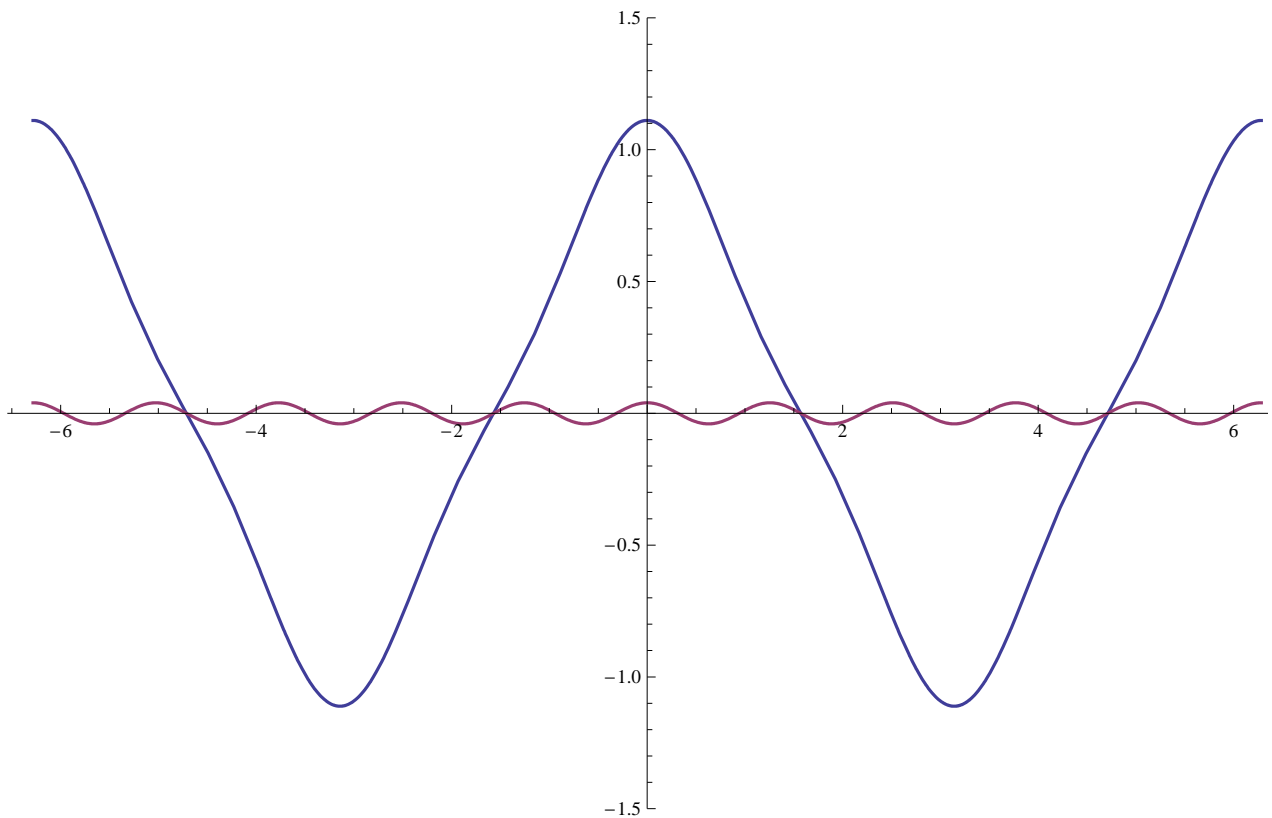
```
In[3]:= Plot[{Cos[x], (1/3^2) Cos[3*x], Cos[x] + (1/3^2) Cos[3*x]}, {x, -2 Pi, 2 Pi},  
PlotRange -> {-1.5, 1.5}, PlotStyle -> {Thickness[.0025]}, ImageSize -> 600]
```



- The graphic below shows the curves
 $(y_1 = \cos[x]) + (y_2 = (1/3^2) \cos[3x])$
 and
 $y_3 = (1/5^2) \sin[5x]$
 $x \in [-2\pi, 2\pi], y \in [-3, 3]$.

QUESTION: what does the curve $y_1 + y_2 + y_3$ look like?

```
Plot[{Cos[x] + (1/3^2) Cos[3*x], (1/5^2) Cos[5*x]}, {x, -2 Pi, 2 Pi},
PlotRange -> {-1.5, 1.5}, PlotStyle -> {Thickness[.0025]}, ImageSize -> 600]
```



```
Plot[{Cos[x] + (1/3^2) Cos[3*x] + (1/5^2) Cos[5*x]}, {x, -2 Pi, 2 Pi},
PlotRange -> {-1.5, 1.5}, PlotStyle -> {Thickness[.0025]}, ImageSize -> 600]
```