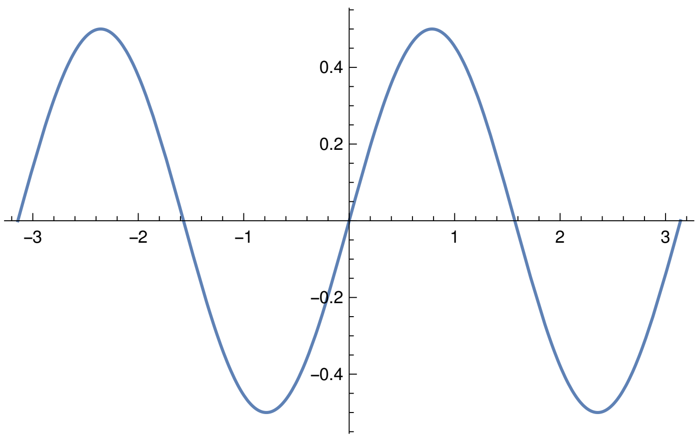
# Mathematica hw3 complex variables

## 37 iii

### Using integrations to confirm symmetries

In[158]:=
```
Plot[Sin[θ] Cos[θ], {θ, -Pi, Pi}]
Integrate[Sin[θ] Cos[θ], {θ, -Pi, Pi}]
```

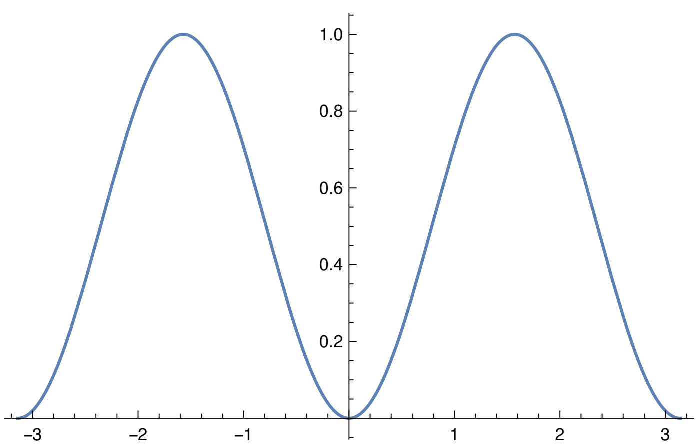
Out[158]=




Out[159]= 0

In[160]:=
```
Plot[Sin[θ] Sin[θ], {θ, -Pi, Pi}]
Integrate[Sin[θ] Sin[θ], {θ, -Pi, Pi}]
```

Out[160]=




Out[161]= $\pi$

## Trying to integrate the infinite series

In[164]:= $bn37 = Sum\left[\frac{-1^{n+1}\, Sin[n*\theta]}{n}, \{n, 1, Infinity\}\right]$

Out[164]= $-\frac{1}{2}\, i \left(Log\left[1 - e^{i\theta}\right] - Log\left[e^{-i\theta}\left(-1 + e^{i\theta}\right)\right]\right)$

In[168]:= $\frac{1}{Pi} * Integrate\left[Sin[n*\theta]\, bn37, \{\theta, -Pi, Pi\}\right]$

Out[168]= $\frac{-n\pi + Sin[n\pi]}{n^2\pi}$

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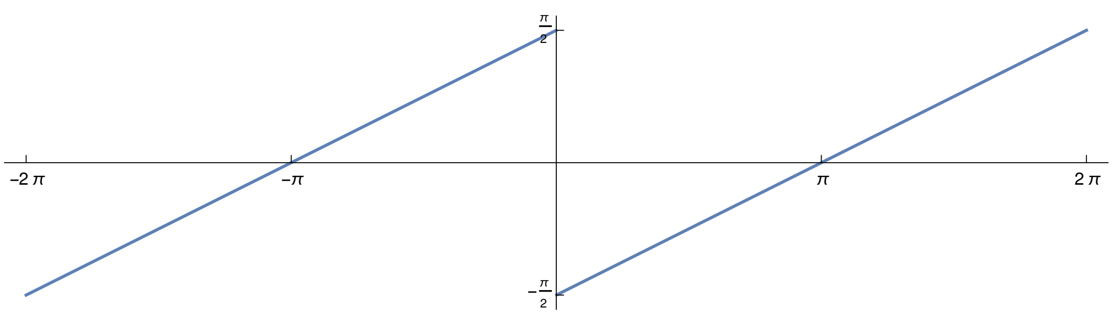
# 37 iv

## I get a slightly different plot than the book. Their line passes through 0 while mine jumps at 0. Given that Sin[0] = 0, it should definitely pass through the origin.

In[152]:= $Plot\left[Sum\left[-1^{n+1}\frac{Sin[n*\theta]}{n}, \{n, 1, Infinity\}\right], \{\theta, -2Pi, 2Pi\},\right.$
$\left. Ticks \to \left\{\{-2Pi, -Pi, Pi, 2Pi\}, \left\{\frac{-Pi}{2}, \frac{Pi}{2}\right\}\right\}, AspectRatio \to Automatic, ImageSize \to Large\right]$

Out[152]=



# 38 iv

## Identical plot to the one in the book.

In[156]:=
```
Plot[Sum[Sin[(2*n-1)*θ]/(2*n-1), {n, 1, Infinity}], {θ, -2 Pi, 2 Pi},
 Ticks → {{-2 Pi, -Pi, Pi, 2 Pi}, {-Pi/4, Pi/4}}, AspectRatio → Automatic, ImageSize → Large]
```

Out[156]=