Examples from Wolfram Documentation on Integration

In[•]:=
```
∫Sqrt[x + Sqrt[x]] dx
```

Out[•]=

$$\frac{1}{12}\sqrt{\sqrt{x}+x}\left(-3+2\sqrt{x}+8x\right)+\frac{1}{4}\text{ArcTanh}\left[\frac{\sqrt{\sqrt{x}+x}}{\sqrt{x}}\right]$$

Put the form traditionally for easier interpretation

In[•]:=
```
∫Sqrt[x + Sqrt[x]] dx;
TraditionalForm[%]
```

Out[•]//TraditionalForm=

$$\frac{1}{12}\sqrt{x+\sqrt{x}}\left(8x+2\sqrt{x}-3\right)+\frac{1}{4}\tanh^{-1}\left(\frac{\sqrt{x+\sqrt{x}}}{\sqrt{x}}\right)$$

In[•]:=

Out[•]=

$$-\frac{1}{4}\left(\sqrt{\pi}\left(\text{EulerGamma}+\text{Log}[4]\right)\right)$$

Why use Mathematica? Use it to be grounded in facts for a topic. Example: Ramanujan's special integrals.

In[•]:=
```
Integrate[Log[(1 + Sqrt[1 + 4 x]) / 2] / x, {x, 0, 1}]
```

Out[•]=

$$\frac{\pi^2}{15}$$

Some integrals converge under only imaginary values.

In[•]:=
```
Integrate[Exp[-a x^2], {x, -∞, ∞}, Assumptions → Re[a] == 0] // FullSimplify
```

Out[•]=

$$\frac{(-a)^{3/4}\sqrt{\frac{\pi}{2}}\left(-1+\text{Sign}[a]\right)}{a^{5/4}}$$

In[•]:=
```
Integrate[1, {x, y} ∈ Disk[]]
```

Out[•]=

$$\pi$$

In[•]:=
```
Integrate[x^2 + y^2, {x, y} ∈ Disk[]]
```

Out[•]=

$$\frac{\pi}{2}$$

Integral over unit disk

In[•]:=

Out[•]=

$$\frac{\pi}{4}$$