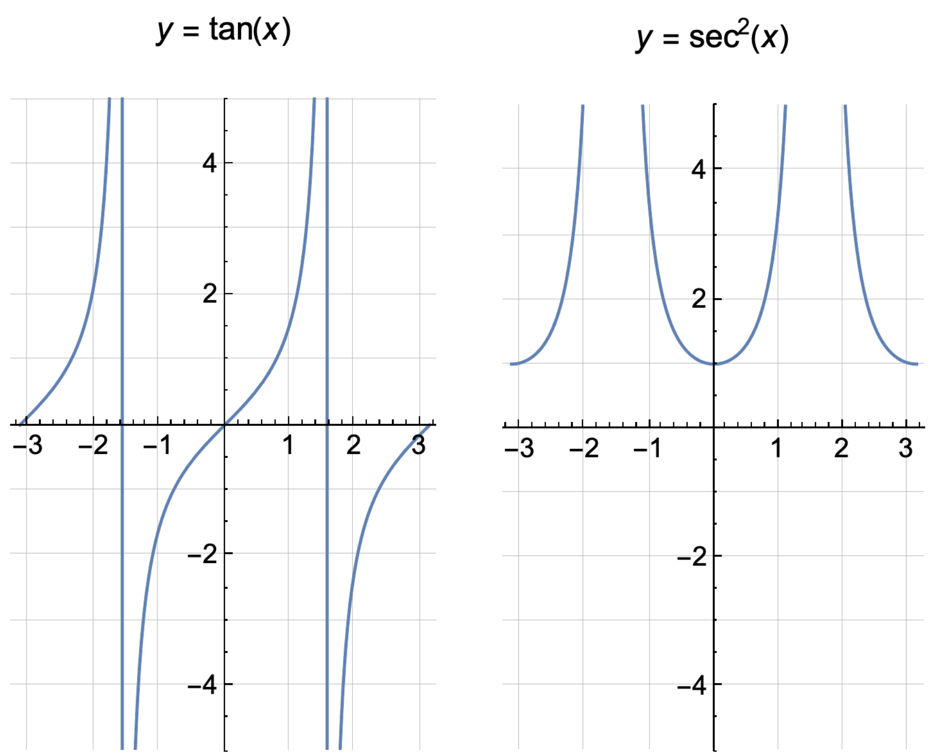
Section 2.4 - Derivatives of Other Trig Functions

Given that f(x)=Tan(x)

In[∘]:=
```
f[x_] := Tan[x]
f'[x]
fp[x_] := Sec[x]^2
```

Out[∘]= Sec[x]^2

Out[∘]=



$$f(x) = \tan(x) = \frac{\sin(x)}{\cos(x)}$$

$$f'(x) = \frac{\cos(x)\,\sin'(x) - \sin(x)\,\cos'(x)}{(\cos(x))^2}$$

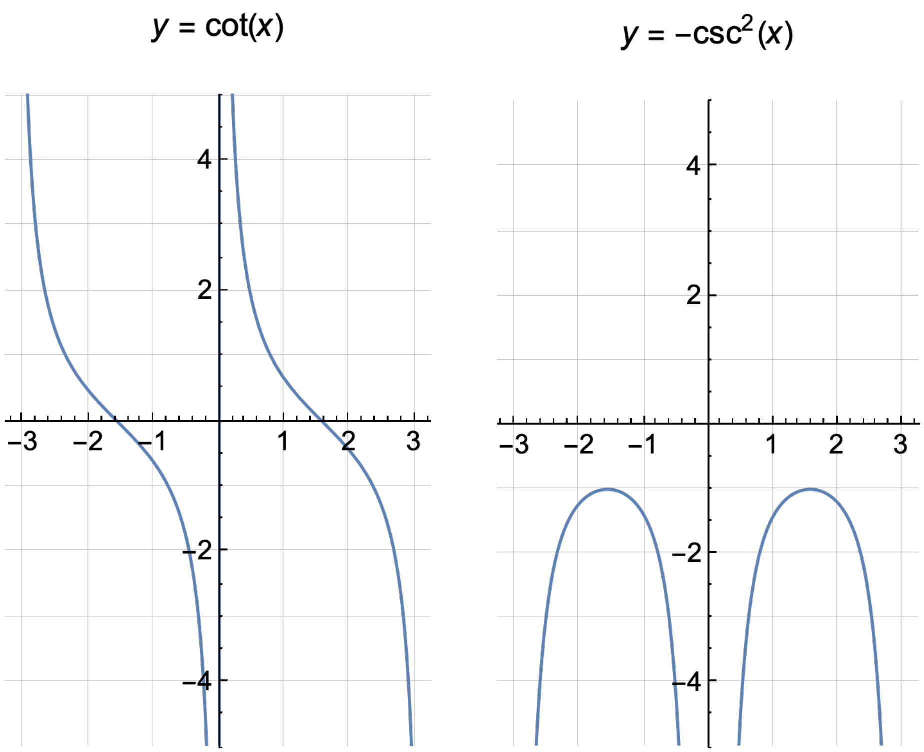
$$= \frac{\cos(x)\cdot\cos(x) - \sin(x)(-\sin(x))}{\cos(x)^2}$$

$$= \frac{\cos^2(x) + \sin^2(x)}{\cos^2(x)} = \frac{1}{\cos^2(x)} = \sec^2(x)$$

Given that f(x)=Cot(x)

```
In[300]:= f[x_] := Cot[x]
          f'[x]
          fp[x_] := -Csc[x]^2
Out[301]= -Csc[x]^2
```

Out[303]=



$$f(x) = \cot(x) = \frac{\cos(x)}{\sin(x)}$$

$$f'(x) = \frac{\sin(x)(\cos(x))' - (\sin(x))'\cos(x)}{\sin^2(x)}$$

$$= \frac{-\sin^2(x) - \cos^2(x)}{\sin^2(x)}$$

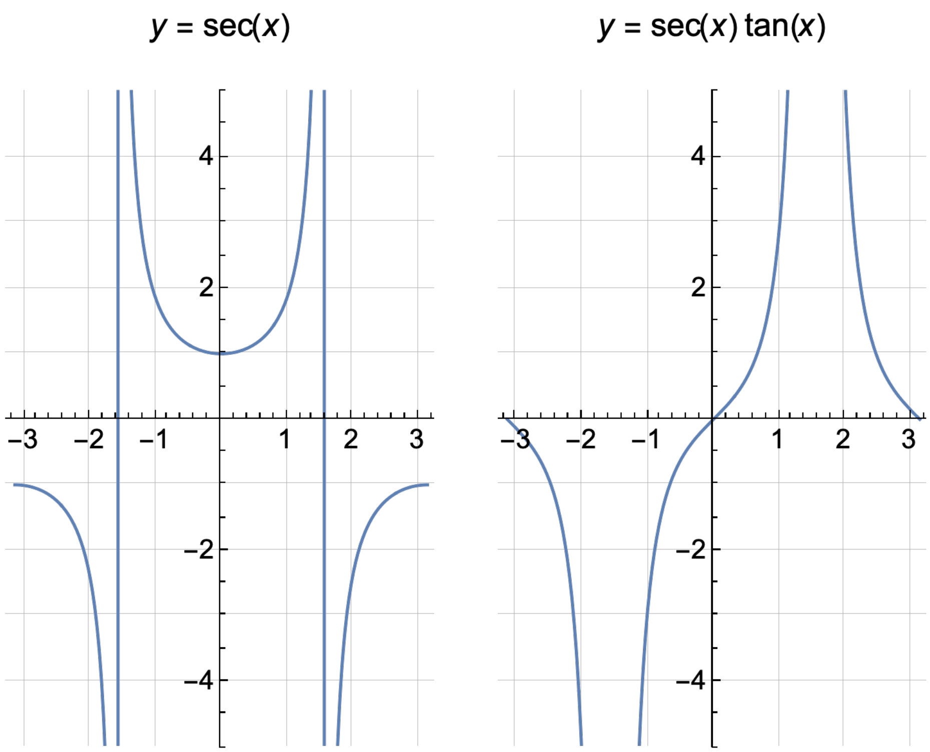
$$= \frac{-1}{\sin^2(x)} = -\csc^2(x)$$

Given that f(x)=Sec(x)

In[307]:=
```
f[x_] := Sec[x]
f'[x]
fp[x_] := Sec[x] Tan[x]
```

Out[308]= Sec[x] Tan[x]

Out[310]=



$$f(x) = \sec(x) = \frac{1}{\cos(x)}$$

$$f'(x) = \left((\cos(x))^{-1}\right)'$$

$$= -1\left((\cos(x))^{-2}\right) \cdot (\cos(x))'$$

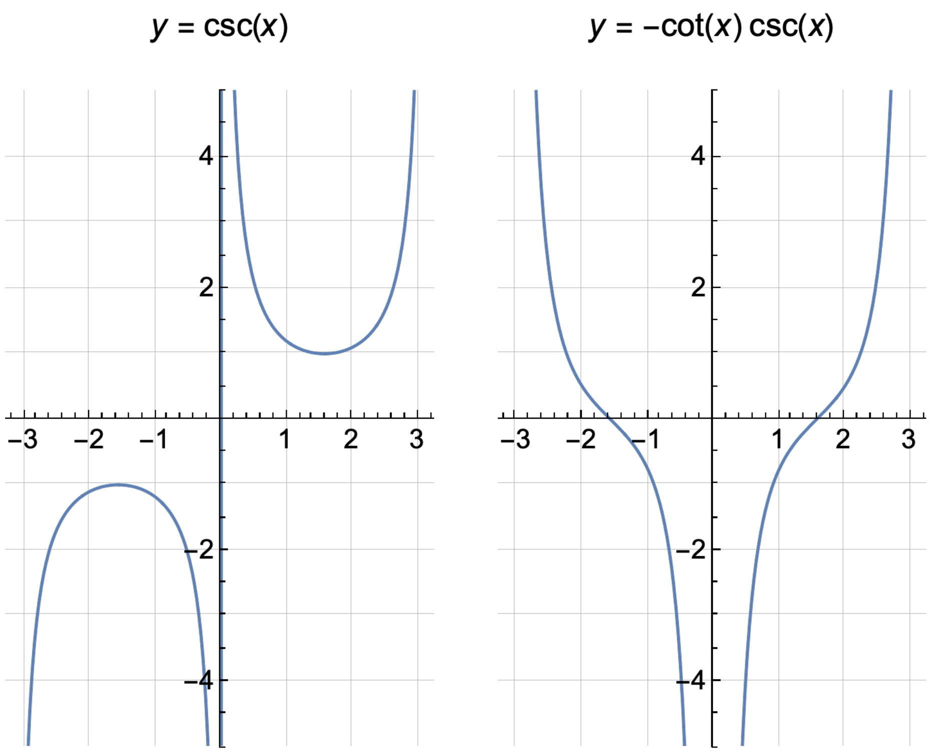
$$= \frac{\sin(x)}{(\cos(x))^2} = \frac{1}{\cos(x)} \frac{\sin(x)}{\cos(x)} = \sec(x)\tan(x)$$

Given that f(x)=Csc(x)

In[320]:=
```
f[x_] := Csc[x]
f'[x]
fp[x_] := -Cot[x] Csc[x]
```

Out[321]= -Cot[x] Csc[x]

Out[323]=



$$f(x) = \csc(x) = \frac{1}{\sin(x)} = (\sin(x))^{-1}$$

$$f'(x) = -1(\sin(x))^{-2} \cdot (\sin(x))'$$

$$= \frac{-\cos(x)}{\sin^2(x)}$$

$$= -\frac{1}{\sin(x)} \frac{\cos(x)}{\sin(x)} = -\csc(x)\cot(x)$$