```
> restart; with(linalg):diff(arctan(theta),theta);
Warning, the protected names norm and trace have been redefined and unprotected
```

$$\frac{1}{1+\theta^2}$$

First define all of your constant and spanwise varying dimensions and calculate things like S, AR, and qinf. DON'T FORGET TO CHANGE THIS

```
> c_of_y:=zz-zzy*y/(b/2);
```

$$c\_of\_y := zz - \frac{2\, zzy\, y}{b}$$

Convert the y (spanwise) variation to theta variation by substituting the map

```
> c:=subs(y=-b/2*cos(theta),c_of_y);
```

$$c = zz - zzy\cos(\theta)$$

I unassign it now so that I don't use this example value (when you put a real one in you will want to remove this unassign statement).

```
> unassign('c');
```

Decide how many terms to use and create your series expansion of the various alpha terms (I call this the theta_eq since it is valid for all theta).

```
> nterms:=2;
```

$$nterms := 2$$

```
> theta_eq:=2*b/(Pi*c)*sum('A[2*n-1]*sin((2*n-1)*theta)','n'=1..nterms)+alpha_lzero+1/sin(theta)*sum('(2*n-1)*A[2*n-1]*sin((2*n-1)*
```

```
theta)','n'=1..nterms)=alpha;
```

$$theta\_eq := 2\,\frac{b\left(\sum_{n=1}^{nterms} A_{2n-1}\sin((2n-1)\theta)\right)}{\pi c} + alpha\_lzero + \frac{\sum_{n=1}^{nterms}(2n-1)A_{2n-1}\sin((2n-1)\theta)}{\sin(\theta)} = \alpha$$

Please note that c,alpha_lzero, and alpha could be functions of theta but, since I have not given them above, they don't appear to be here or even in the next step when we plug in angles.

Since we took 2 terms we need to evaluate the equation at two locations to get 2 equations.

```
> eq1:=evalf(subs(theta=given_angle1,theta_eq));
  eq2:=evalf(subs(theta=given_angle2,theta_eq));
```

$$eq1 := 0.6366197722\,\frac{b\left(\sum_{n=1}^{nterms} A_{2n-1}\sin((2n-1)\,given\_angle1)\right)}{c} + alpha\_lzero + \frac{\sum_{n=1}^{nterms}(2n-1)A_{2n-1}\sin((2n-1)\,given\_angle1)}{\sin(given\_angle1)} = \alpha$$

$$eq2 := 0.6366197722 \frac{b \left(\sum_{n=1}^{nterms} A_{2n-1} \sin((2n-1)\, given\_angle2) \right)}{c} + alpha\_lzero + \frac{\sum_{n=1}^{nterms} (2n-1) A_{2n-1} \sin((2n-1)\, given\_angle2)}{\sin(given\_angle2)} = \alpha$$

solve the equations and then calculate the required aerodynamic quantities

```
> soln:=solve({eq1,eq2},{A[1],A[3]}):
  assign(soln):
Error, (in assign) invalid arguments
```

The assign statement will allow you to use the A[n] values to calculate the requested aerodynamic quantities but I leave you to learn that. The above process can easily be repeated for as many terms as you like by cutting and pasting from nterms to here below and modifying as I will do in class.

```
> unassign('A[1]','A[3]');
```