# ForwardDiffAnswers

November 12, 2018

## 1 ForwardDiff Answers

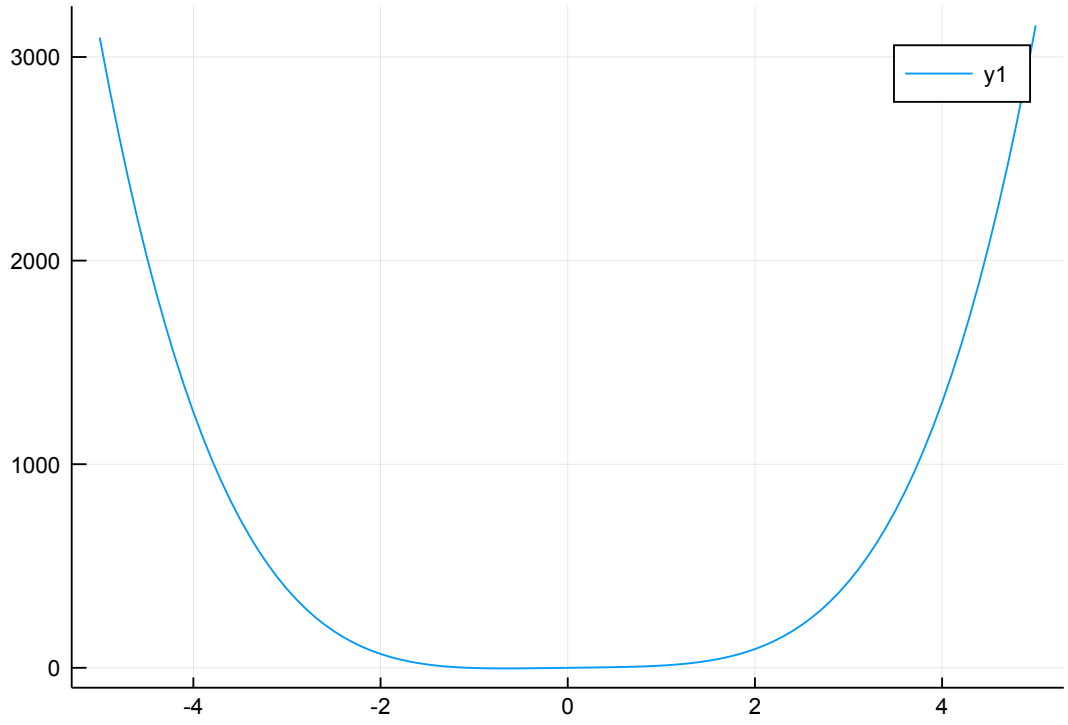
### 1.1 Problem 1

```
In [1]: f(x) = x^5 + 3x^2
        using ForwardDiff
        fprime(x) = ForwardDiff.derivative(f,x)
```

```
Out[1]: fprime (generic function with 1 method)
```

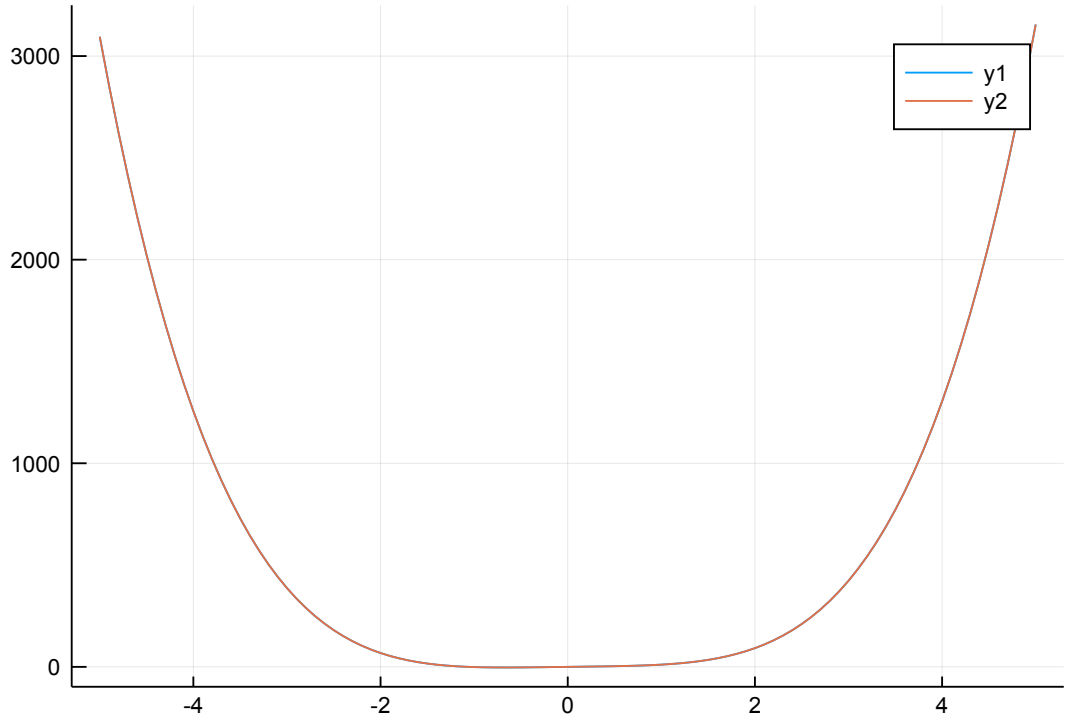
```
In [2]: using Plots; gr()
        x = -5:0.1:5
        plot(x,fprime.(x))
```

```
Out[2]:
```



In [3]:
```
plot!(x,5x.^4+6x)
```

Out[3]:




## 1.2 Problem 2

In [5]:
```
using LinearAlgebra
function spherical2Cartesian(coordinates)
    r, ,  = coordinates
    x = r*sin()*cos()
    y = r*sin()*sin()
    z = r*cos()
    [x, y, z]
end

, ,  = 2.5, /4, /2
coordinates = [, , ]
J = ForwardDiff.jacobian(spherical2Cartesian, coordinates)
detJ = det(J)

det_analytical = ^2 * sin()
det_analytical  detJ
```

```
Out[5]: true
```