ForwardDiffAnswers

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1 ForwardDiff Answers

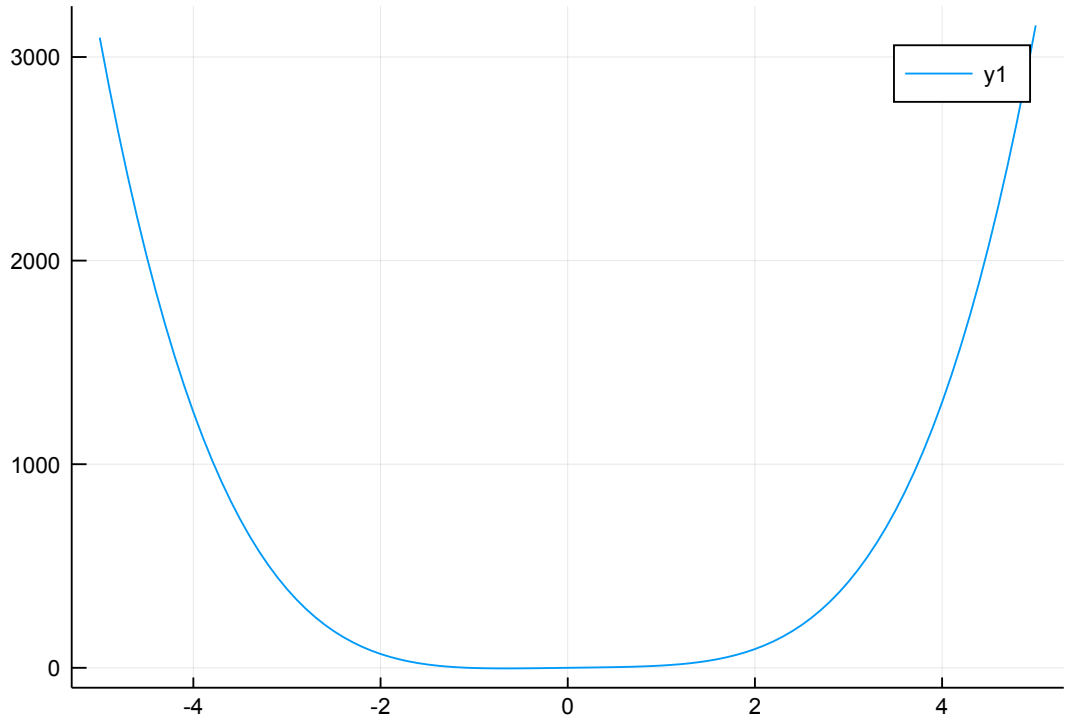
1.1 Problem 1

```
In [4]: f(x) = x^5 + 3x^2
        using ForwardDiff
        fprime(x) = ForwardDiff.derivative(f,x)
```

```
Out[4]: fprime (generic function with 1 method)
```

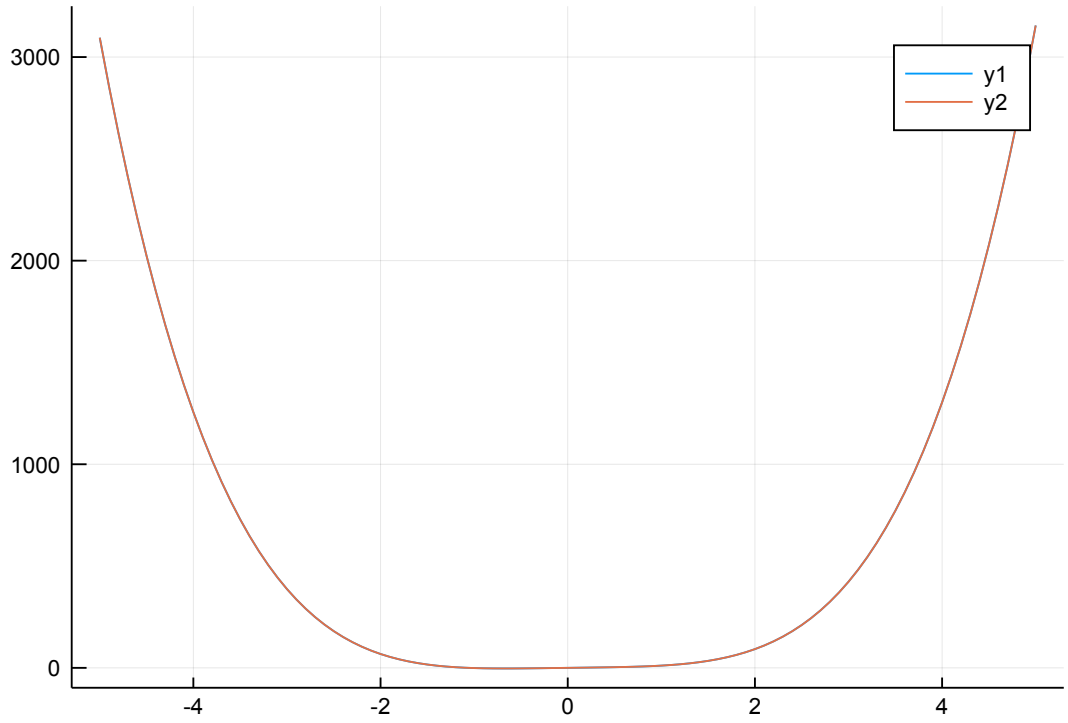
```
In [5]: using Plots; gr()
        x = -5:0.1:5
        plot(x,fprime.(x))
```

```
Out[5]:
```



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

Out[6]:



1.2 Problem 2

In [9]:
```
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[9]: true
```