

ForwardDiffAnswers

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1 ForwardDiff Answers

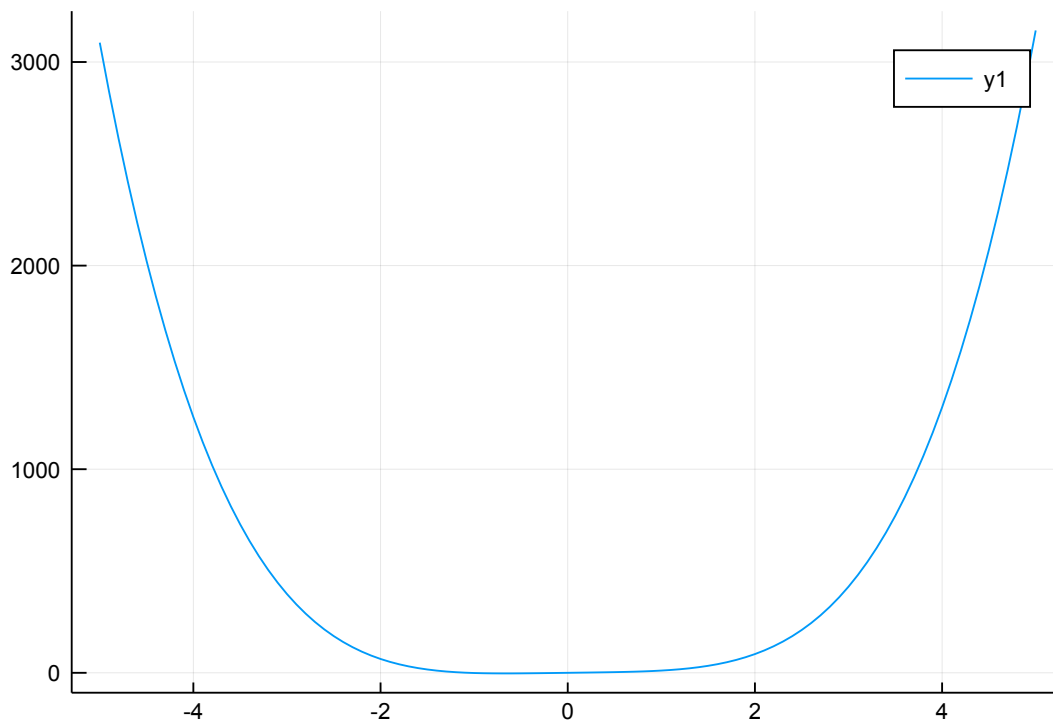
1.1 Problem 1

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

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

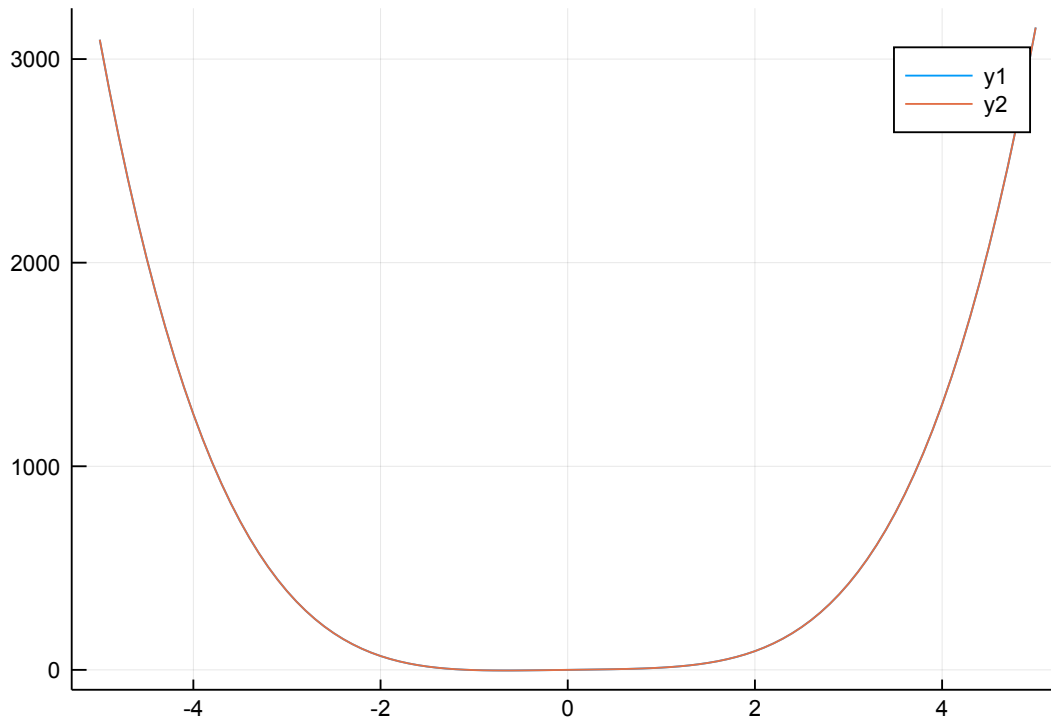
```
In [2]: using Plots; gr()  
        x = -5:0.1:5  
        plot(x,fprime.(x))
```

```
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
```