

Lab 4

Kevin White

208 9:00AM 9/20/2021

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Question 1

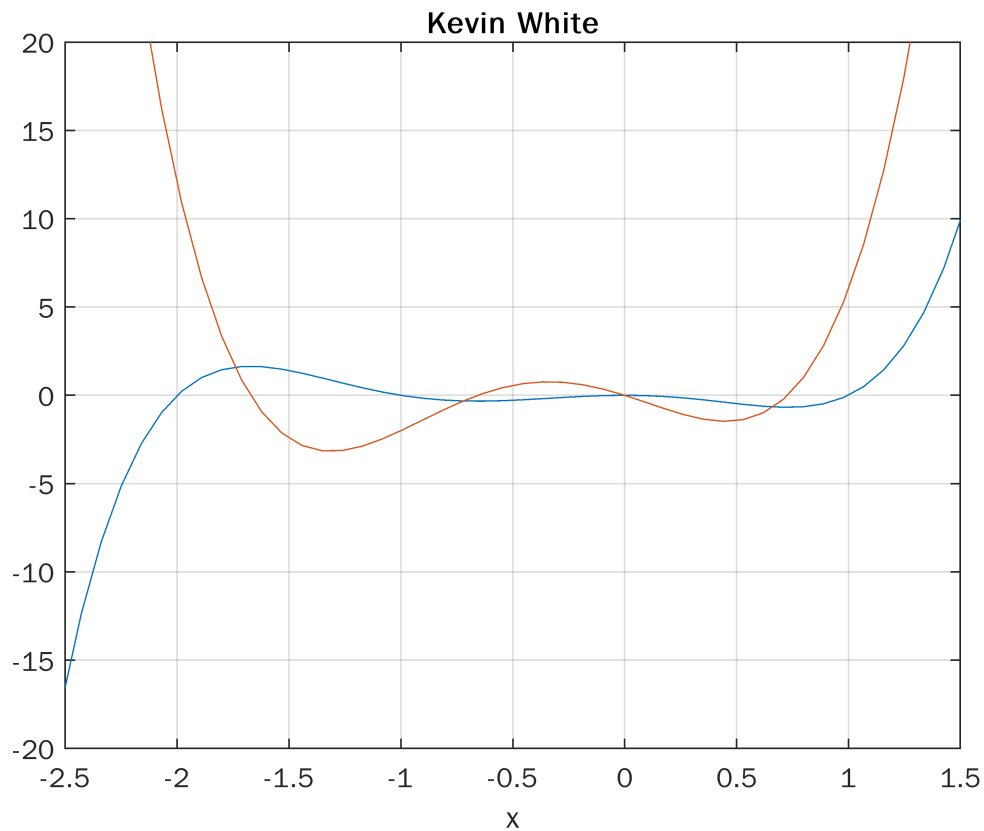
```
syms x
f(x)=x^2*(x^2-1)*(x+2)
```

$$f(x) = x^2 (x^2 - 1) (x + 2)$$

```
df = diff(f,x)
```

$$df(x) = 2x^3(x+2) + x^2(x^2-1) + 2x(x^2-1)(x+2)$$

```
fandfprime(f,-2.5, 1.5, -20, 20, 'Kevin White')
```



- a. $[-2.5, -1.75]$ and $[0.75, 1.5]$
- b. $[-2.5, -1.75]$ and $[-0.75, 0]$ and $[0.75, 1.5]$
- c. $[-1.75, -0.5]$ and $[0.75, 0.75]$
- d. $[-1.75, 0.75]$ and $[0, 0.75]$

e.

Peaks: $x = -1.75, 0$

Valleys: $x = -0.6, 0.75$

f. $x = -1.75, -0.75, 0, 0.6$

Question 2.

```
syms x
f(x) = x / (x^2 + 1)
```

$f(x) =$

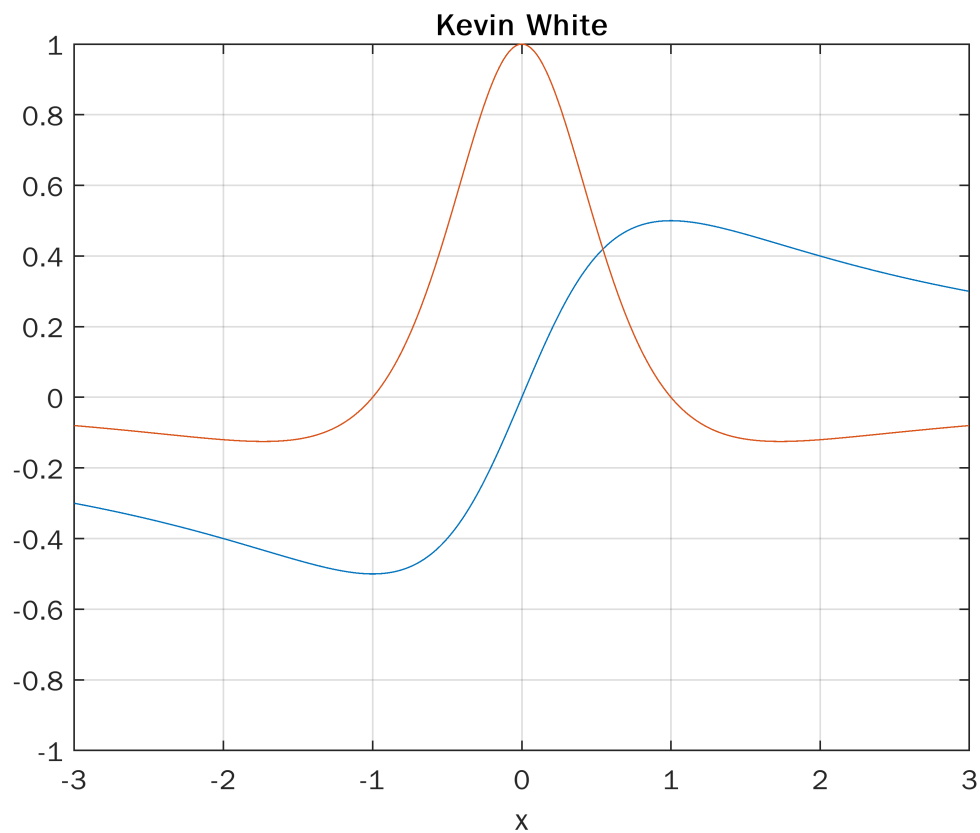
$$\frac{x}{x^2 + 1}$$

```
df = diff(f,x)
```

$df(x) =$

$$\frac{1}{x^2 + 1} - \frac{2x^2}{(x^2 + 1)^2}$$

```
fandfprime(f,-3, 3, -1, 1, 'Kevin White')
```



a.[1, 1]

b.[-1, 1]

c.[-3, 1] and [1, 3]

d.[-3, -1] and [1, 3]

e.

Peak: $x = 1$

Vally: $x = -1$

f. $x = 0.5$

3.

a.

The derivative will typically rise with the function however, the rise is typically "delayed" when looking at it left to right.

b.

The Derivative will also rise when the function is falling.

c.

The middle of a peak for the derivative is typically when the function has its highest rate of change.

4.

```
syms x
spike(x) = 3*abs(x^2-4)+2
```

$$\text{spike}(x) = 3|x^2 - 4| + 2$$

```
df = diff(spike,x)
```

$$df(x) = 6x \operatorname{sign}(x^2 - 4)$$

```
fandfprime(spike,-4, 4, -20, 20, 'Kevin White')
```

a.

The two x values for the derivative that x does not exist is 2 because its an asymptote

b.

```
spike(-2)
```

```
ans = 2
```

```
spike(2)
```

```
ans = 2
```

```
fandfprime(spike,-4, 4, -20, 20, 'Kevin White')
```

