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10/22/2021

208 9:00AM 10/18/2021

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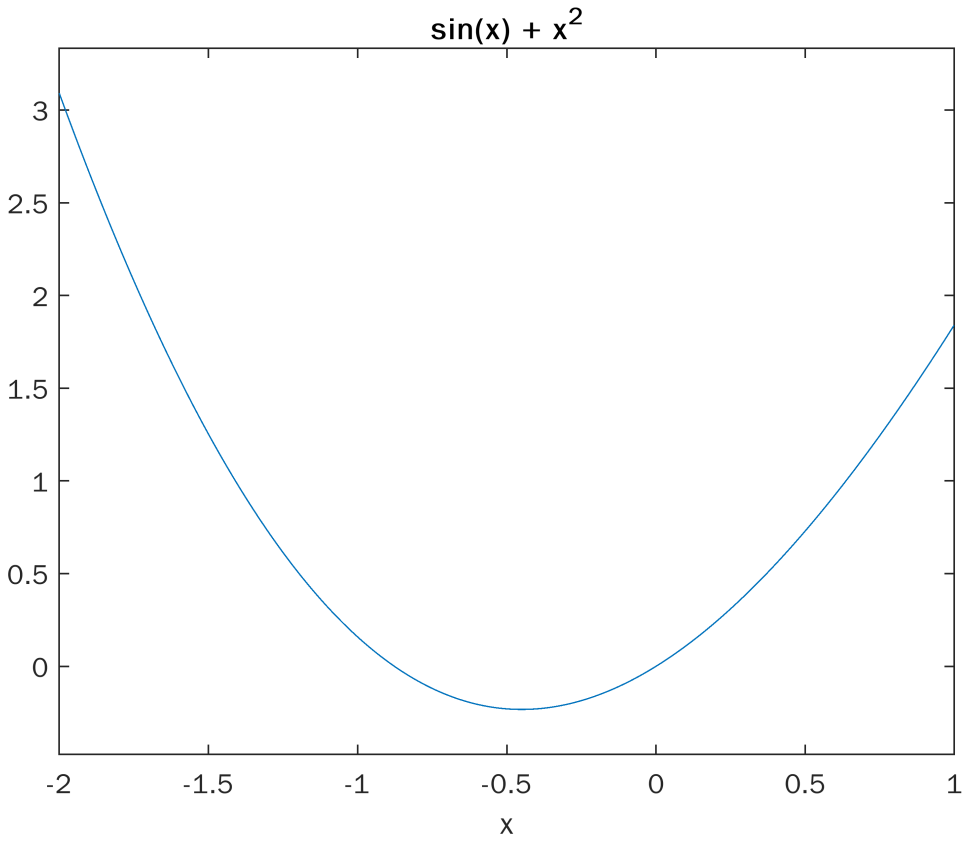
Question 1

```
syms x
f(x) = sin(x) + x^2
```

f(x) = $\sin(x) + x^2$

```
ezplot(f(x), [-2 1])
```




```
%Step 2
g(x)= x-f(x)/diff(f(x),x)
```

g(x) =

$$x - \frac{\sin(x) + x^2}{2\,x + \cos(x)}$$

```
clearvars x
X(1)=0.5
```

```
X = 0.5000
```

```
X(2)=vpa(g(X(1)))
```

```
X = 1×2
    0.5000    0.1115
```

```
k=1;
while abs(X(k+1)-X(k)) > 10^(-8)
    k=k+1;
    X(k+1)=vpa(g(X(k)));
end
vpa(X',8)
```

```
ans =
```

$$\begin{pmatrix} 0.5 \\ 0.11150814 \\ 0.0098392649 \\ 0.000094635906 \\ 8.9539775e\text{-}9 \\ 8.0173711e\text{-}17 \end{pmatrix}$$

The aproxement solution is 0.000094635906 For the problum

Question 2

```
syms x
f(x) = tan(x)
```

```
f(x) = tan(x)
```

```
%Step 2
g(x)= x-f(x)/diff(f(x),x)
```

```
g(x) =
```

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

```
clearvars x
X(1)=3;
X(2)=vpa(g(X(1)));
k=1;
 while abs(X(k+1)-X(k)) > 10^(-50)
     k=k+1;
     X(k+1)=vpa(g(X(k)));
 end
vpa(X',50)
```

```
ans =
```

$$\begin{pmatrix} 3.0 \\ 3.139707749099462930075787880923599004745483398437 5 \\ 3.141592649125255487518870722851715981960296630859 4 \\ 3.141592653589793238462643383279502884197169399375 1 \\ 3.141592653589793238462643383279502884197169399375 1 \\ 0.000000000000000008017371121584333500369782856132799141266917595117 4 \end{pmatrix}$$

IGNORE LAST VALUE... I CANT GET RID OF IT!

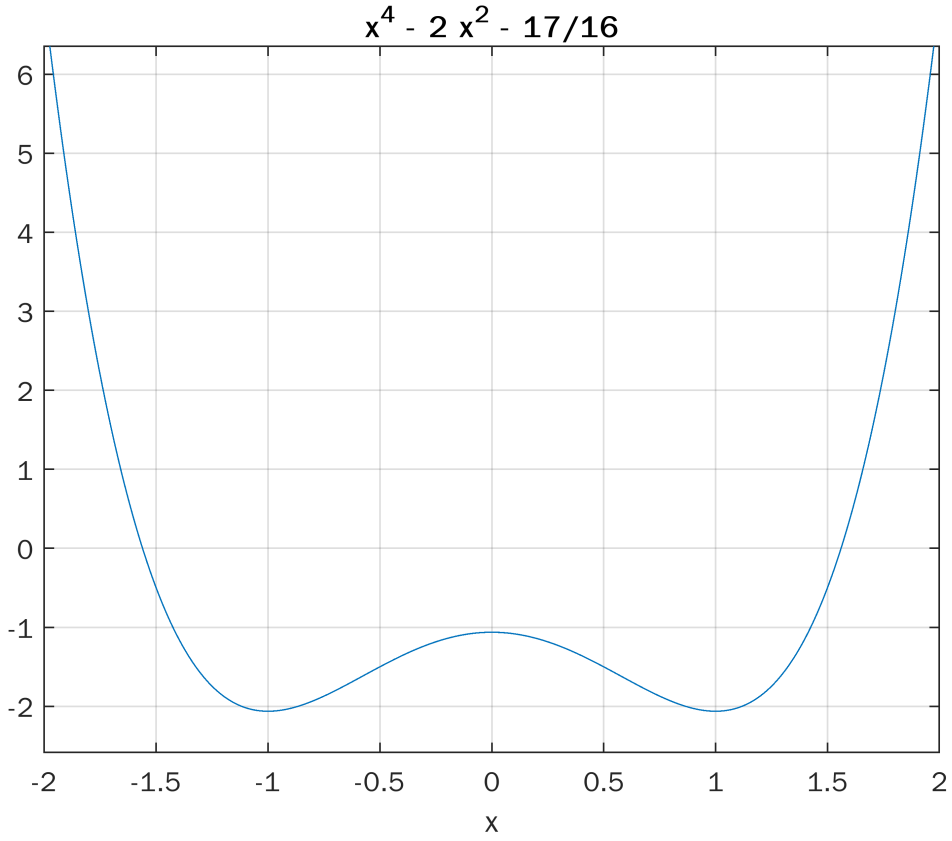
Question 3

```
%Step 1
syms x
f(x)= x^4-2*x^2-17/16
```

```
f(x) =
```

$$x^4 - 2\,x^2 - \frac{17}{16}$$

```
ezplot(f(x),[-2 2])
grid on
```



Newton's Method fails at X(1) = 0.5 Because There is no value at 0.5

```
%Step 4
```

```
g(x)=x-f(x)/diff(f(x),x)
```

g(x) =

$$x - \frac{-x^4 + 2x^2 + \frac{17}{16}}{4x - 4x^3}$$

```
clearvars X
X(1) = 2;
X(2) = vpa(g(X(1)));
k=1;
while abs(X(k+1)-X(k)) > 10^-(13)
 k=k+1;
 X(k+1)=vpa(g(X(k)));
end
vpa(X',13)
```

ans =

$$\begin{pmatrix} 2.0 \\ 1.7109375 \\ 1.585690210638 \\ 1.561647049741 \\ 1.560815077009 \\ 1.560814102204 \\ 1.560814102203 \\ 1.560814102203 \end{pmatrix}$$

Root of R0 is 1.560814102203

%Step 5

X-intercepts

(-1.55,0) & (1.55,0)