TP4

```
def point_fixe(g,x0,N):
    s=[x0]
    for i in range(1,N+1):
        s+=[g(s[i-1])]
    return s[N]
```

```
def point_fixe1(g,x0,N):
    xdata=x0
    for i in range(1,N+1):
        xdata=g(xdata)
    return xdata
```

```
g1(x)=(x^4+6*x^2+36)/60
g2(x)=-36/(x^3+6*x-60)
g3(x)=(-6*x^2+60*x-36)^0.5
```

```
point_fixe(g1,0.5,10)
```

```
0.644398863660360
```

```
point_fixe(g2,0.5,10)
```

```
0.644398864224552
```

```
point_fixe(g3,0.5,10)
```

```
3905.92632995321 + 9188.57760124392*I
```

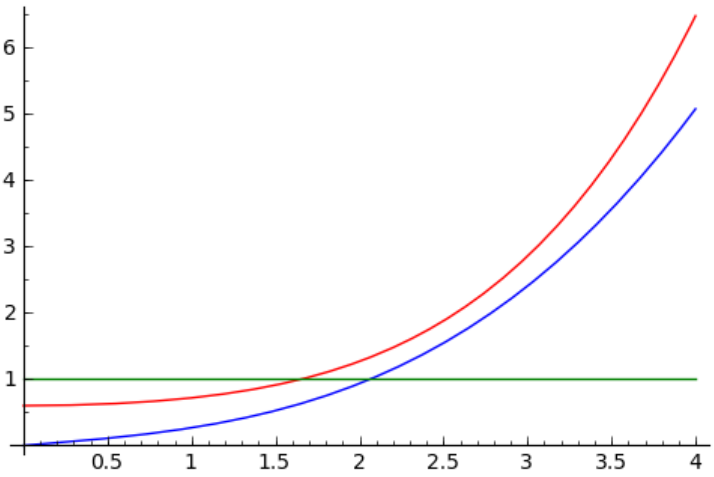
```
point_fixe1(g1,0.5,10)
```

```
0.644398863660360
```

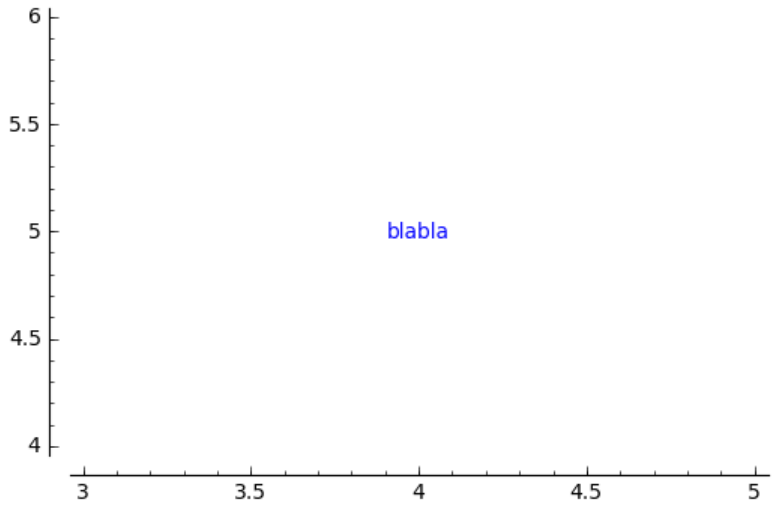
```
f=x^2+x^3
derivative(f)
```

```
3*x^2 + 2*x
```

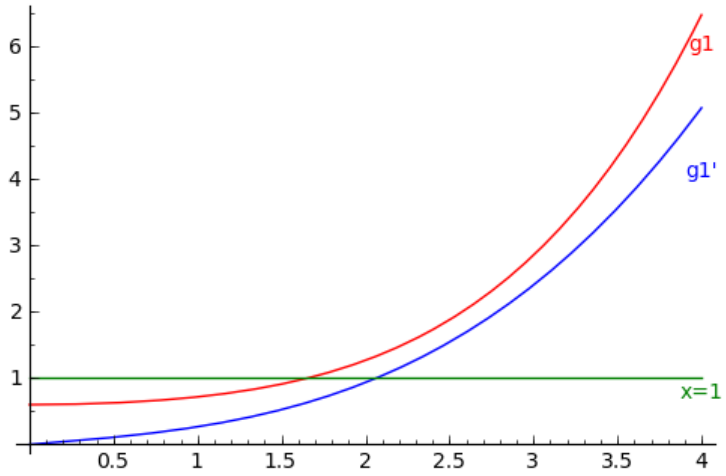
```
plot(g1(x),x,0,4,color='red')+plot(g1.derivative(),x,0,4,color='blue')+plot(1,0,4,color='g
```




```
text("blabla",(4,5))
```




```
plot(g1(x),x,0,4,color='red')+text("g1",
(4,6),color='red')+plot(g1.derivative(),x,0,4,color='blue')+text("g1'",
(4,4.1),color='blue')+plot(1,0,4,color='green')+text("x=1",(4,0.8),color='green')
```




```
def pt_fixe_steffenssen(g,x0,epsilon,N):
    n = 0
    p = x0
    q =(x0*g(g(x0))-g(x0)^2)/(g(g(x0))-2*g(x0)+x0).n()
    while ((abs(p-q)>epsilon) or (n<N)):
        q = g(p).n()
        p = q
        n += 1
    return(q)
```

```
def point_fixe(g,x0,epsilon,N):
    n = 0
    p = x0
    q = g(x0).n()
    while ((abs(p-q)>epsilon) or (n<N)):
        q = g(p).n()
        p = q
        n += 1
    return(q)
```

```
from timeit import default_timer
```

```
t=default_timer()
```

```
pt_fixe(cos(x),0.0, 10^(-3),10)
tt=default_timer()
tt-t
```

```
0.0050249099731445312
```

```
s=default_timer()
pt_fixe_steffenssen(cos(x),0.0, 10^(-3),10)
v=default_timer()
v-s
```

```
0.0082540512084960938
```

```

```