par2M

(segundo parcial de matemáticas)

Problema 1.

```
g=(1-exp(x^3))/(x-sin(x));n=numerator(g);d=denominator(g)
taylor(n,x,0,6),taylor(d,x,0,6);limit(g,x=0),limit(g,x=oo)
```

```
(-1/2*x^6 - x^3, -1/120*x^5 + 1/6*x^3)
(-6, -Infinity)
```

Problema 3.

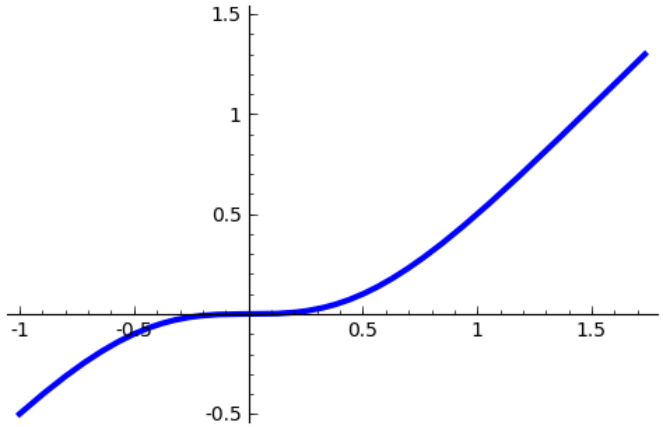
```
f=x^3/(1+x^2);F(x)=integral(f,x);FF(x)=F(tan(x))-F(1);FF(x)
```

```
1/2*tan(x)^2 - 1/2*log(tan(x)^2 + 1) + 1/2*log(2) - 1/2
```

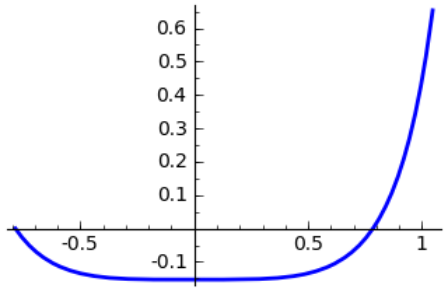
```
expand(diff(FF(x),x)),expand(FF(pi/3))
```

```
(tan(x)^3, 1/2*log(2) - 1/2*log(4) + 1)
```

```
plot(f,x,-1,sqrt(3),ymin=-0.5,ymax=1.5,thickness=3)
```




```
plot(FF,x,-pi/4,pi/3,thickness=2,figsize=[4,2.5])
```



Problema 4.

```
h=arctan(1/x)/arctan(x^2);
n(integral(h,x,0.1,1)),n(integral(h,x,1,10000))
```

```
(12.060621223151887, 6.0094872169798261)
```

Problema 5.

```
f=(9-exp(x))/(exp(2*x)+3);factor(diff(f,x));_.solve(x)
```

```
(e^(2*x) - 18*e^x - 3)*e^x/(e^(2*x) + 3)^2
[x == log(-2*sqrt(21) + 9), x == log(2*sqrt(21) + 9), e^x == 0]
```

```
show(integrate(f,x));integrate(f,x,0,log(3));_.n()
```

$$-\frac{1}{3}\sqrt{3}\arctan\left(\frac{1}{3}\sqrt{3}e^{x}\right)+3\,x-\frac{3}{2}\log\left(e^{(2\,x)}+3\right)$$

```
-1/18*pi*sqrt(3) + 3*log(3) + 3/2*log(4) - 3/2*log(12)
1.34561853896313
```

```
plot(f,x,0,4,thickness=2)+plot([2,1/2],x,0,log(3),color='red')
```