febM

(examen de febrero de matemáticas)

Parte 1:

Problema 1.

```
df=diff(arctan(x-log(2-x)),x);df,df.subs(x=1)
```

```
(-(1/(x - 2) - 1)/((x - log(-x + 2))^2 + 1), 1)
```

Problema 2.

```
var('n')
an=(n^2*sin(3/n))/sqrt(4*n^2+9);limit(an,n=infinity)
```

```
3/2
```

Problema 3.

```
f=abs(x^2-4);solve(f<=3,x);fp(x)=diff(f,x)
```

```
[[x == -2, -3 == 0], [x == 2, -3 == 0], [2 < x, x^2 - 7 == 0], [
< -2, x^2 - 7 == 0], [x == -1], [x == 1], [1 < x, -x^2 + 7
> 0], [x < -1, -x^2 + 7 > 0]]
```

```
fp(x),fp(-
3),limit(fp(x),x=2,dir='plus'),limit(fp(x),x=2,dir='minus')
```

```
(2*(x^2 - 4)*x/abs(x^2 - 4), -6, 4, -4)
```

Problema 4.

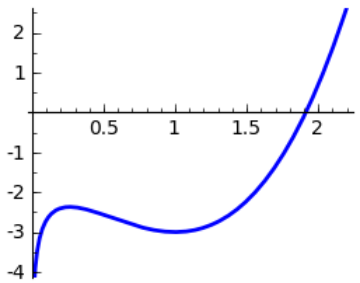
```
f(x)=x^3-4*x+log(x);df=factor(diff(f(x),x));solve(df,x);
```

```
[x == 1/6*sqrt(21) - 1/2, x == 1]
```

```
df,factor(diff(f(x),x,2));f(1/2),f(1),f(2),find_root(f(x),1,2)
```

```
((x - 1)*(3*x^2 + 3*x - 1)/x, (6*x^3 - 1)/x^2)
(log(1/2) - 15/8, -3, log(2), 1.9133427544871984)
```

```
plot(f,0,2.2,ymin=-4,ymax=2.5,thickness=2,figsize=[3,2.4])
```



Parte 2:

Problema 1.

```
S=sum(x^n/2^n/n,n,1,oo);S,diff(S,x)
```

```
(-log(-1/2*x + 1), -1/(x - 2))
```

Problema 2.

```
g=(1+x^3)^(-1/2);integral(g,x,0,oo);numerical_integral(g,0,1000)
```

```
1/3*beta(1/6, 1/3)
(2.741118657173554, 3.293333664857595e-07)
```

```
assume(x>0);F=integrate(g,x,0,x^2);Ft=taylor(F,x,0,15)
Ft;limit((Ft-sin(x^2))/x^6,x=0);limit((F-sin(x^2))/x^6,x=oo)
```

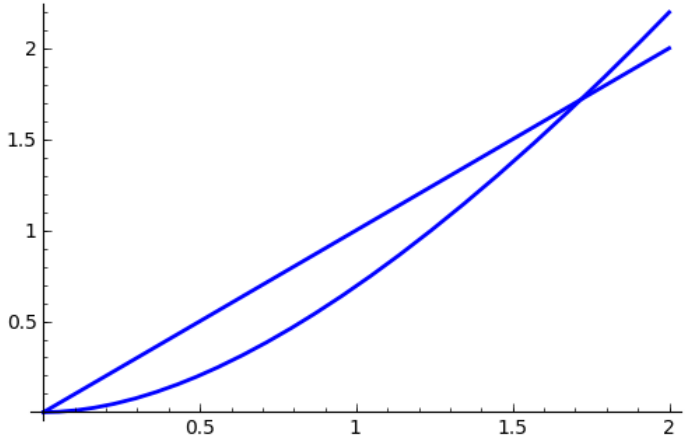
```
3/56*x^14 - 1/8*x^8 + x^2
1/6
limit(-sin(x^2)/x^6 + integrate(1/sqrt(x^3 + 1), x, 0, x^2)/x^6,
+Infinity)
```

Problema 3.

```
f=x*log(1+x);integrate(f,x);integrate(x-f,x,0,exp(1)-1)
```

```
1/2*x^2*log(x + 1) - 1/4*x^2 + 1/2*x - 1/2*log(x + 1)
-e + 1/4*e^2 + 5/4
```

```
plot([f,x],x,0,2,thickness=2)
```



jsMath