pem12

(problemas evaluables de matemáticas 1 y 2)

Evaluables 1:

Problemas 1.

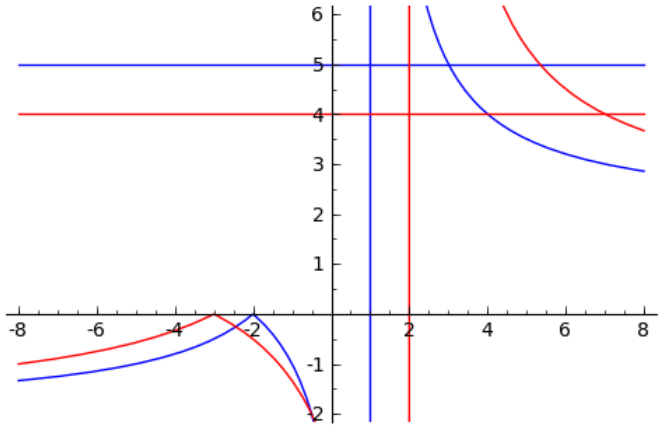
```
f(x)=abs(2*x+4)/(x-1);h(x)=abs(2*x+6)/(x-2)
solve(f==5,x);solve(f<5,x);solve(h==4,x);solve(h<4,x)
```

```
[x == 1/5*abs(2*x + 4) + 1]
[[x < -2], [x == -2], [-2 < x, x < 1], [3 < x]]
[x == 1/4*abs(2*x + 6) + 2]
[[x == -3], [-3 < x, x < 2], [x < -3], [7 < x]]
```

```
f(-5),f(-1),f(1/7),f(3);h(-8),h(-4/3),h(1/3),h(7)
```

```
(-1, -1, -5, 5)
(-1, -1, -4, 4)
```

```
da=plot([f,5],-8,8);db=plot([h,4],-8,8,color='red');
show(da+db,ymin=-2,ymax=6)
```



Problemas 2.

```
ga(x)=2*sin(2*x)-cos(4*x)-3
solve(ga(x)==0,x);ga(x).expand_trig();_.simplify_trig()
```

```
[cos(4*x) == 2*sin(2*x) - 3]
-sin(x)^4 + 6*sin(x)^2*cos(x)^2 - cos(x)^4 + 4*sin(x)*cos(x) - 3
-8*cos(x)^4 + 4*sin(x)*cos(x) + 8*cos(x)^2 - 4
```

```
ga.find_root(0,1);n(pi/4);ga(pi/4),ga(5*pi/4)
```

```
0.7853981633988013
0.785398163397448
(0, 0)
```

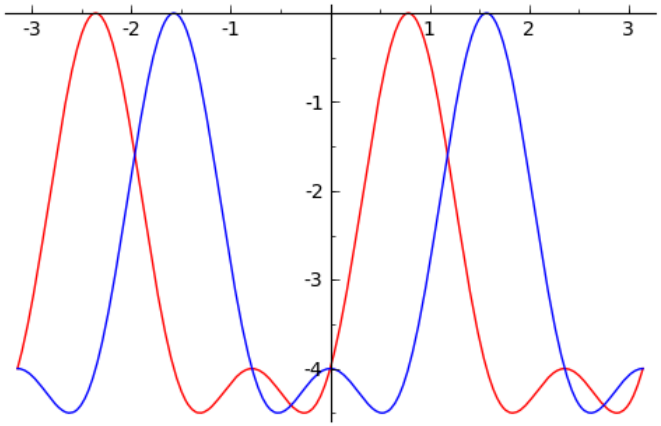
```
gb(x)=cos(4*x)-2*cos(2*x)-3
solve(gb(x)==0,x);gb(x).expand_trig();_.simplify_trig().factor()
```

```
[cos(4*x) == 2*cos(2*x) + 3]
sin(x)^4 - 6*sin(x)^2*cos(x)^2 + 2*sin(x)^2 + cos(x)^4 - 2*cos(x)
- 3
4*(2*cos(x)^2 - 3)*cos(x)^2
```

```
gb.find_root(1,2);n(pi/2);gb(pi/2),gb(3*pi/2)
```

```
1.5707963267816727
1.57079632679490
(0, 0)
```

```
plot(ga,-pi,pi,color='red')+plot(gb,-pi,pi)
```



Problemas 3.

```
z=sqrt(3)-i
z.abs();n(_),arg(z);expand(z^5);abs(_).n(),arg(_);_[0]*sin(_[1])
```

```
abs(sqrt(3) - I)
(2.0000000000000, -0.523598775598)
-16*sqrt(3) - 16*I
(32.000000000000, -2.61799387799)
-16.000000000000
```

```
z=1+sqrt(3)*i
z.abs();n(_),arg(z);expand(z^5);abs(_).n(),arg(_);_[0]*cos(_[1])
```

```
abs(I*sqrt(3) + 1)
(2.0000000000000, 1.0471975512)
-16*I*sqrt(3) + 16
(32.000000000000, -1.0471975512)
16.000000000000
```

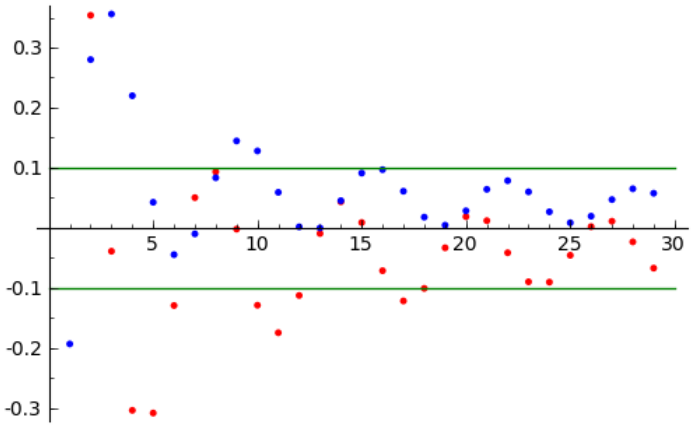
Evaluables 2.

Problemas 1.

```
var('n')
a(n)=(7*sin(n)-sqrt(n))/(5*n+4);b(n)=(sqrt(n)-4*cos(n))/(5*n+1)
limit(a(n),n=infinity),limit(b(n),n=infinity)
```

```
(0, 0)
```

```
ad=point([(n,a(n)) for n in srange(2,30)],color='red')
bd=point([(n,b(n)) for n in srange(1,30)])
ad+bd+plot([0.1,-0.1],0,30,color='green')
```




```
sq=n-2*sqrt(n)
find_root(sq+4/5-14,0,50),find_root(sq+1/15-8,0,50)
```

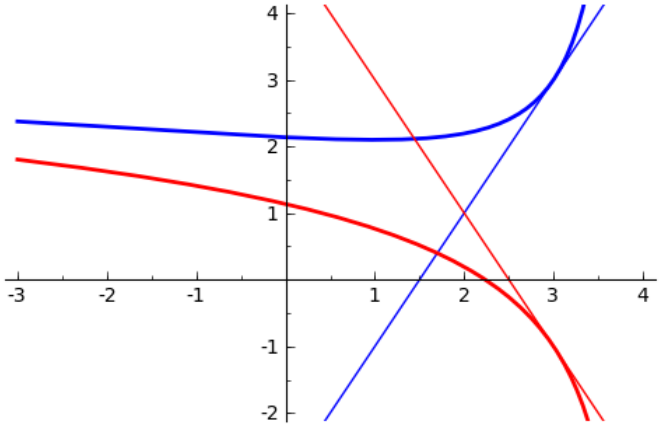
```
(22.736577472566708, 15.911069805722267)
```

Problemas 2.

```
var('b');f(x,b)=log(4-x)+b/(4-x)
factor(diff(f,x));factor(diff(f,x,2))
```

```
(x, b) |--> (b + x - 4)/(x - 4)^2
(x, b) |--> -(2*b + x - 4)/(x - 4)^3
```

```
d3=plot(f(x,3),-3,4,thickness=2)
d1=plot(f(x,-1),-3,4,thickness=2,color='red')
t3=plot(2*x-3,-3,4);t1=plot(5-2*x,-3,4,color='red')
show(d3+t3+d1+t1,ymin=-2,ymax=4)
```

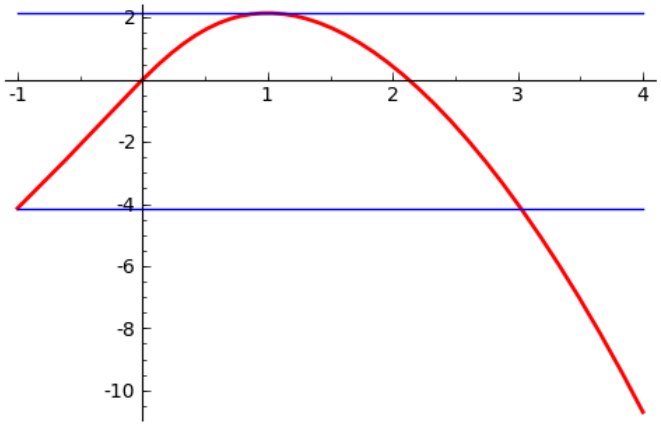


Problemas 3.

```
g(x)=4*arctan(x)-x^2;show(factor(diff(g(x),x)))
```

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

```
plot(g(x),-1,4,thickness=2,color='red')+plot([pi-1,-pi-1],-1,4)
```




```
g.find_root(2,3)
```

```
2.1273215814956812
```