pem12

(problemas evaluables de matemáticas 1 y 2)

Evaluables 1:

Problemas 1.

```
> f:=abs(2*x+4)/(x-1):solve(f=5,x);[solve(f=1,x)];solve(f<5,x);
  h:=abs(2*x+6)/(x-2):solve(h=4,x);[solve(h=1,x)];solve(h<4,x);
  eval([subs(x=-5,f),subs(x=-1,f),subs(x=1/7,f),subs(x=3,f)]);
  eval([subs(x=-8,h),subs(x=-4/3,h),subs(x=1/3,h),subs(x=7,h)]);
```

$$3$$

$$[\,]$$

$$RealRange(-\infty, Open(1)), RealRange(Open(3), \infty)$$

$$7$$

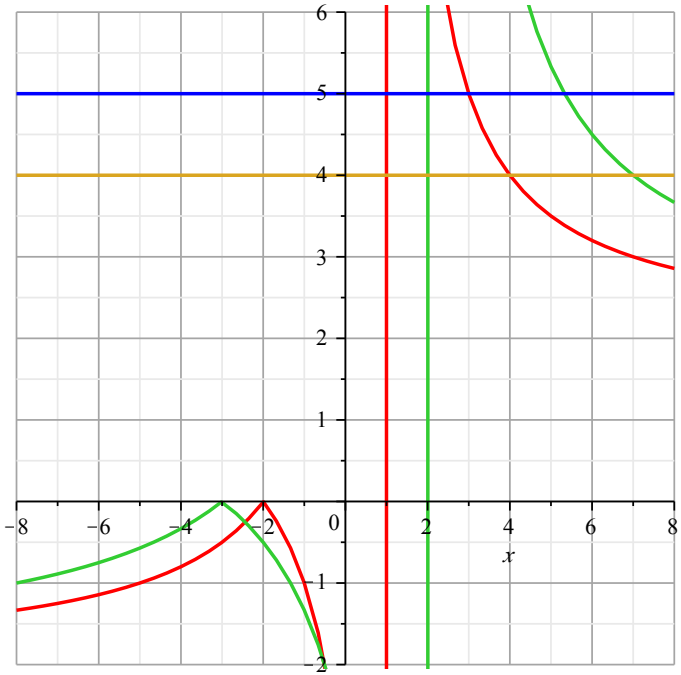
$$[\,]$$

$$RealRange(-\infty, Open(2)), RealRange(Open(7), \infty)$$

$$[-1, -1, -5, 5]$$

$$[-1, -1, -4, 4]$$

```
> plot([f,h,4,5],x=-8..8,-2..6,gridlines=true,thickness=2);
```



Problemas 2.

```
> ga:=2*sin(2*x)-cos(4*x)-3:solve(ga=0);
  expand(ga);normal([solve(%)]);
```

$$\frac{1}{4}\pi, \frac{1}{2}\arctan\left(-2, I\sqrt{3}\right), \frac{1}{2}\arctan\left(-2, -I\sqrt{3}\right)$$

$$4\sin(x)\cos(x) - 8\cos(x)^4 + 8\cos(x)^2 - 4$$

$$\left[\frac{1}{4}\pi, -\frac{3}{4}\pi, \arctan\left(-\frac{1}{2}\sqrt{3} + \frac{1}{2}I, \frac{1}{2}\sqrt{3} + \frac{1}{2}I\right), \arctan\left(\frac{1}{2}\sqrt{3} + \frac{1}{2}I, -\frac{1}{2}\sqrt{3} + \frac{1}{2}I\right), \arctan\left(\frac{1}{2}\sqrt{3} - \frac{1}{2}I, -\frac{1}{2}\sqrt{3} - \frac{1}{2}I\right), \arctan\left(-\frac{1}{2}\sqrt{3} - \frac{1}{2}I, \frac{1}{2}\sqrt{3} - \frac{1}{2}I\right)\right]$$

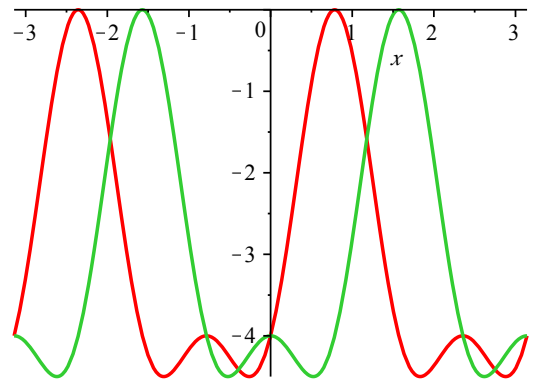
```
> gb:=cos(4*x)-2*cos(2*x)-3:solve(gb=0);
  expand(gb);solve(%);
```

$$\frac{1}{2}\arccos(2), \frac{1}{2}\pi$$

$$8\cos(x)^4 - 12\cos(x)^2$$

$$\frac{1}{2}\pi, \frac{1}{2}\pi, \arccos\left(\frac{1}{2}\sqrt{6}\right), \pi - \arccos\left(\frac{1}{2}\sqrt{6}\right)$$

```
> plot([ga,gb],x=-Pi..Pi,thickness=2);
```



Problemas 3.

```
> z:=sqrt(3)-I:polar(z);[expand(z^5),polar(expand(z^5))];
```

$$\text{polar}\left(2, -\frac{1}{6}\pi\right)$$

$$\left[-16I - 16\sqrt{3}, \text{polar}\left(32, -\frac{5}{6}\pi\right)\right]$$

```
> z:=1+sqrt(3)*I:polar(z);[expand(z^5),polar(expand(z^5))];
```

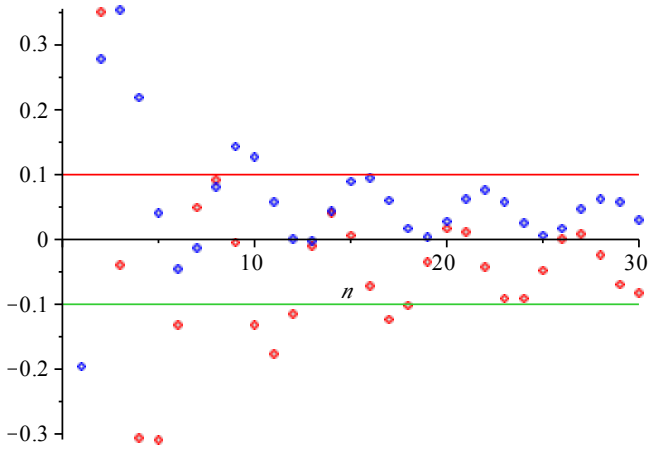
$$\text{polar}\left(2, \frac{1}{3}\pi\right)$$

$$\left[-16I\sqrt{3} + 16, \text{polar}\left(32, -\frac{1}{3}\pi\right)\right]$$

Evaluables 2:

Problemas 1.

```
> an:=(7*sin(n)-sqrt(n))/(5*n+4):bn:=(sqrt(n)-4*cos(n))/(5*n+1):
  da:=plot([seq([n,an],n=2..30)],style=point):
  db:=plot([seq([n,bn],n=1..30)],style=point,color=blue):
  with(plots):display(da,db,plot([0.1,-0.1],n=0..30));
```



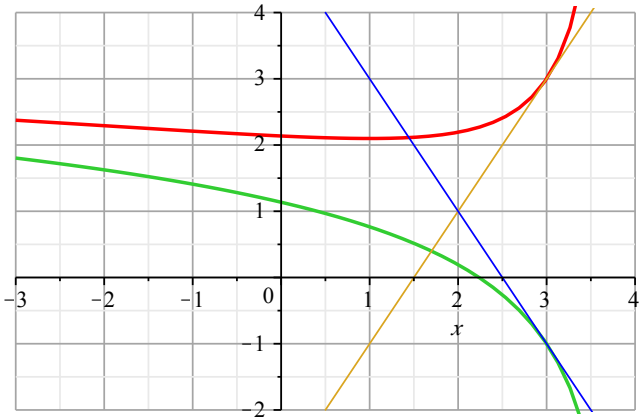

```
> [fsolve(n-2*sqrt(n)+4/5-14),fsolve(n-2*sqrt(n)+1/15-8)];
```

$$[22.73657747, 15.91106981]$$

Problemas 2.

```
> f:=log(4-x)+b/(4-x):factor([diff(f,x),diff(f,x$2)]);
  plot([subs(b=3,f),subs(b=-1,f),2*x-3,5-2*x],
  x=-3..4,-2..4,thickness=[2,2,1,1],gridlines=true);
```

$$\left[\frac{-4+x+b}{(-4+x)^2}, -\frac{-4+x+2\,b}{(-4+x)^3}\right]$$



Problemas 3.

```
> g:=x->4*arctan(x)-x^2:factor(diff(g(x),x));
  [g(-1),g(1/sqrt(3)),g(1),g(sqrt(3)),g(3),g(4)];evalf(%,5);
  fsolve(g,2..3);
```

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

$$\left[-\pi-1, \frac{2}{3}\pi-\frac{1}{3}, \pi-1, \frac{4}{3}\pi-3, 4\arctan(3)-9, 4\arctan(4)-16\right]$$

$$[-4.1416, 1.7611, 2.1416, 1.1887, -4.0040, -10.697]$$

$$2.127321581$$

```
> with(plots):multiple(plot,
   [[g(x),Pi-1,-1-Pi],x=-1..4,thickness=[3,1,1],color=blue],
   [[-g(-x),1-Pi,Pi+1],x=-4..1,thickness=[3,1,1],color=red],
  gridlines=true);
```