p2ed

(parcialillo 2 de ecuaciones)

Problema 1.

```
> dsolve(t^2*diff(x(t),t$2)-t*diff(x(t),t)=4*ln(t));
```

$$x(t) = \frac{1}{2}\, t^2\, \_C1 - \ln(t)^2 - \ln(t) + \_C2$$

Problema 2.

```
> dsolve({D(x)(t)=2*x(t)+y(t)+2*exp(2*t),
   D(y)(t)=2*x(t)+3*y(t)+3*exp(t),x(0)=1,y(0)=-3},{x(t),y(t)});
```

$$\{x(t) = e^{2t} - t e^{t}, y(t) = -e^{t} + t e^{t} - 2 e^{2t}\}$$

Problema 3.

```
> P:=b->z^4+9*z^3+b*z^2+36*z+16:bz:=solve(P(b),b):
  assume(a,real):assume(c,real):ac:=(2*a+9)*(c^2+a^2)+8*a:
  factor(Im(subs(z=a+c*I,bz))*(a^2+c^2)^2);
  [factor(subs(a=-4,ac)),subs(z=4*I-4,bz),subs(z=-7/2,bz)];
  [factor(discrim(P(b),z)),evalf([5533/196,113/4,57/2],4)];
```

$$-c\sim\left(2\, a\sim^3 + 9\, a\sim^2 + 2\, a\sim c\sim^2 + 8\, a\sim + 9\, c\sim^2\right)\left(c\sim^2 - 4 + a\sim^2\right)$$

$$\left[(c\sim - 4)\,(c\sim + 4),\ \frac{81}{2},\ \frac{5533}{196}\right]$$

$$\left[16\,(b+44)\,(b-28)\,(4\,b-113)^2,\ [28.23, 28.25, 28.50]\right]$$

```
> factor([P(-62),P(-44)]);factor([P(-28),P(-14)]);
  factor([P(-2),P(8)]);factor([P(16),P(22)]);
  factor([P(26),P(28)]);factor([P(5533/196),P(113/4)]);
  factor(2*P(81/2));
```

$$\left[(z-1)\,(z-4)\,(z^2+14\,z+4),\ (z^2+13\,z+4)\,(z-2)^2\right]$$

$$\left[(z^2+12\,z+4)\,(z^2-3\,z+4),\ (z^2+11\,z+4)\,(z^2-2\,z+4)\right]$$

$$\left[(z^2+10\,z+4)\,(z^2-z+4),\ (z^2+4)\,(z^2+9\,z+4)\right]$$

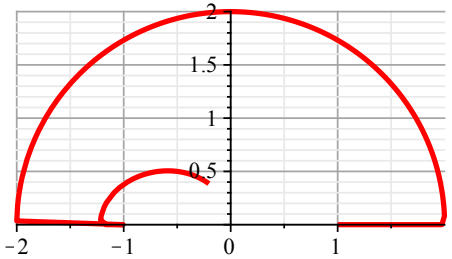
$$\left[(z^2+8\,z+4)\,(z^2+z+4),\ (z^2+7\,z+4)\,(z^2+2\,z+4)\right]$$

$$\left[(z^2+3\,z+4)\,(z^2+6\,z+4),\ (z+4)\,(z+1)\,(z+2)^2\right]$$

$$\left[\frac{1}{196}\,(2\,z+7)\,(7\,z+8)\,(14\,z^2+61\,z+56),\ \frac{1}{4}\,(2\,z^2+9\,z+8)^2\right]$$

$$(2\,z^2+2\,z+1)\,(z^2+8\,z+32)$$

```
> with(plots):complexplot(evalf([solve(P(b),z)]),b=-62..88,
  numpoints=303,thickness=3,gridlines=true);
```




```
> evalf([[solve(P(-62))],[solve(P(-44))]],3);
  evalf([[solve(P(-28))],[solve(P(-14))]],2);
  evalf([[solve(P(-2))],[solve(P(8))]],2);
  evalf([[solve(P(16))],[solve(P(22))]],2);
  evalf([[solve(P(26))],[solve(P(28))]],2);
  evalf([[solve(P(5533/196))],[solve(P(113/4))]],3);
  evalf([solve(P(57/2))],2);evalf([solve(P(81/2))],2);
```

$$[[1., 4., -0.28, -13.7], [-0.32, -12.7, 2., 2.]]$$

$$[[-0.4, -12., 1.5 + 1.3\,I, 1.5 - 1.3\,I], [-0.5, -10., 1. + 1.7\,I, 1. - 1.7\,I]]$$

$$[[-0.4, -9.6, 0.50 + 2.0\,I, 0.50 - 2.0\,I], [2.\,I, -2.\,I, -0.5, -8.5]]$$

$$[[-0.6, -7.4, -0.50 + 2.0\,I, -0.50 - 2.0\,I], [-0.7, -6.3, -1. + 1.7\,I, -1. - 1.7\,I]]$$

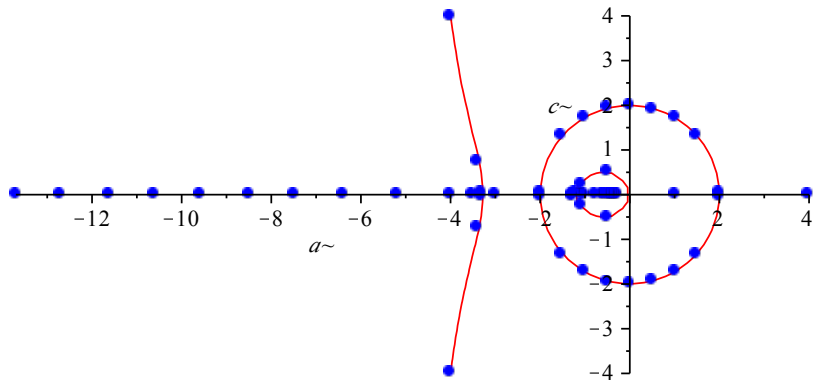
$$[[-1.5 + 1.3\,I, -1.5 - 1.3\,I, -0.8, -5.2], [-4., -1., -2., -2.]]$$

$$[[-3.50, -1.14, -1.32, -3.04], [-1.22, -3.28, -1.22, -3.28]]$$

$$[-1.1 + 0.25\,I, -3.4 + 0.75\,I, -1.1 - 0.25\,I, -3.4 - 0.75\,I]$$

$$[-0.50 + 0.50\,I, -0.50 - 0.50\,I, -4. + 4.\,I, -4. - 4.\,I]$$

```
> rr:=complexplot([-13.7,-0.28,1,4,   -12.7,-.32,2+I/40,2-I/40,
  -11.6,-.36,1.5+1.32*I,1.5-1.32*I, -10.6,-.4,1+1.73*I,1-1.73*I,
  -9.6,-.42,.5+1.9*I,.5-1.9*I,       -8.5,-.47,2*I,-2*I,
  -7.5,-.54,-.5+1.94*I,-.5-1.94*I, -6.4,-.63,-1+1.73*I,-1-1.73*I,
  -5.2,-0.76,-1.5+1.32*I,-1.5-1.32*I,  -4,-1,-2+I/40,-2-I/40,
  -3.5,-3,-1.3,-1.1,  -3.3+I/40,-1.2+I/40,-3.3-I/40,-1.3-I/40,
  -1.1+.25*I,-3.4+.75*I, -1.1-.25*I,-3.4-.75*I,
  -.5+.5*I,-.5-.5*I,-4+4*I,-4-4*I],
  style=point,symbol=solidcircle,symbolsize=15,color=blue):
> cc:=implicitplot([a^2+c^2=4,ac],a=-4..2,c=-4..4):
  display([cc,rr]);
```




```
> [factor(P(20)),ifactor(discrim(P(20),z))];
  factor(P(20),sqrt(33));evalf([solve(P(20))],4);
```

$$\left[z^4 + 9\,z^3 + 20\,z^2 + 36\,z + 16,\ -(2)^{13}\,(3)^2\,(11)^2\right]$$

$$-\frac{1}{4}\left(2\,z^2 + 9\,z + z\sqrt{33} + 8\right)\left(-2\,z^2 - 9\,z + z\sqrt{33} - 8\right)$$

$$[-0.8139 + 1.827\,I, -0.5898, -6.783, -0.8139 - 1.827\,I]$$