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Tugas No.1

```
%Program MATLAB untuk kurva  $2y^2+x^2=k$  dan  $y=cx^2$ 
clear all;
clc;
syms x y k

y=k*x^2
dy=diff('k*x^2','x')
k=solve('dy=2*k*x','k')
edif=subs('y-k*x^2=0','k',k)
edif_ortog=subs(edif,'dy','-1/Dy')

Dy=solve(edif_ortog,'Dy')
y_ortog=dsolve('Dy =-1/2*x/y','x')

figure
for C1=1:6
ezplot(eval(y_ortog(1)),[-3,3])
axis square
axis equal
hold on
grid on
end

for C1=1:6
ezplot(eval(y_ortog(2)),[-3,3])
axis square
axis equal
hold on
grid on
end

for k=-1.25:0.25:1.25
ezplot(eval(y),[-3,3])
hold on
grid on
end

f1='k*x^2-y'
for k=1:1:10
ezplot(eval(f1))
axis square
axis equal
hold on
grid on
end

for k=-10:1:-1
ezplot(eval(f1))
```

```

axis square
axis equal
hold on
grid on
end

f2='2*y^2+x^2-k^2'
for k=-8:1:8
ezplot(eval(f2))
axis square
axis equal
hold on
grid on
end

title('keluarga kurva 2*y^2+x^2-k^2 dan k*x^2-y')

```

Output MATLAB

```

y =
    k*x^2

dy =
    2*k*x

k =
    1/2*dy/x

edif =
    y-1/2*dy*x = 0

edif_ortog =
    y-1/2*(-1/Dy)*x = 0

Dy =
    -1/2*x/y

y_ortog =
    1/2*(-2*x^2+4*C1)^(1/2)

```

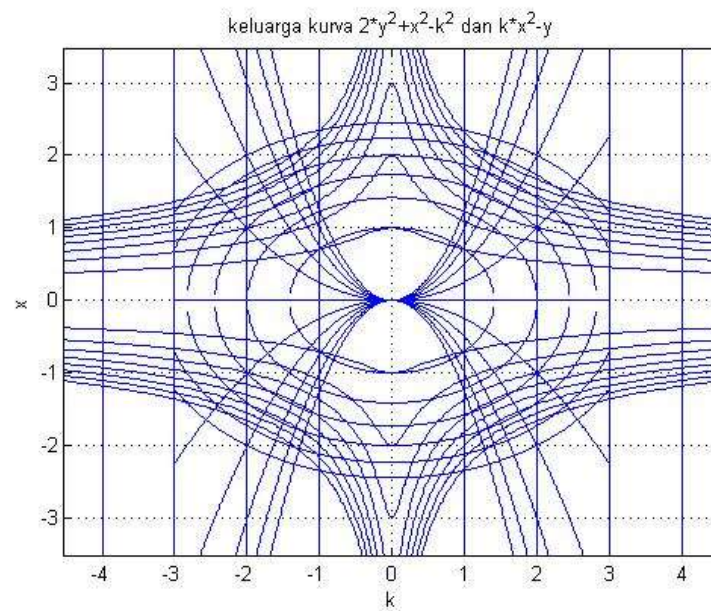
$$-1/2*(-2*x^2+4*C1)^{(1/2)}$$

f1 =

$$k*x^2-y$$

f2 =

$$2*y^2+x^2-k^2$$



Tugas No. 2

```
clear all
clc

syms x y k

y=(2*k*x-x^2)^(1/2)
dy=diff('(2*k*x-x^2)^(1/2)', 'x')
k=solve('dy=1/2/(2*k*x-x^2)^(1/2)*(2*k-2*x)', 'k')
edif=subs('y-(2*k*x-x^2)^(1/2)=0', 'k', k)
edif_ortog=subs(edif, 'dy', '-1/Dy')

f1='y^2+x^2-2*k*x'
for k=-3:0.1:3
    ezplot(eval(f1))
    axis square
    axis equal
    hold on
    grid on
end

for k=3:-0.1:-3
    ezplot(eval(f1))
    axis square
    axis equal
    hold on
    grid on
end

f2='x^2+y^2-k*y'
for k=-5:1:5
    ezplot(eval(f2))
    axis square
    axis equal
    hold on
    grid on
end

title('keluarga kurva y^2+x^2-2kx dan x^2+y^2-ky')
```

Output MATLAB

```
y =
    (2*k*x-x^2)^(1/2)

dy =
    1/2/(2*k*x-x^2)^(1/2)*(2*k-2*x)
```

k =

$$dy*(dy+(dy^2+1)^{(1/2)})*x+x$$

$$dy*(dy-(dy^2+1)^{(1/2)})*x+x$$

edif =

$$y-(2*(dy*(dy+(dy^2+1)^{(1/2)})*x+x)*x-x^2)^{(1/2)}=0$$

$$y-(2*(dy*(dy-(dy^2+1)^{(1/2)})*x+x)*x-x^2)^{(1/2)}=0$$

edif_ortog =

$$y-(2*((-1/Dy)*((-1/Dy)+((-1/Dy)^2+1)^{(1/2)})*x+x)*x-x^2)^{(1/2)}=0$$

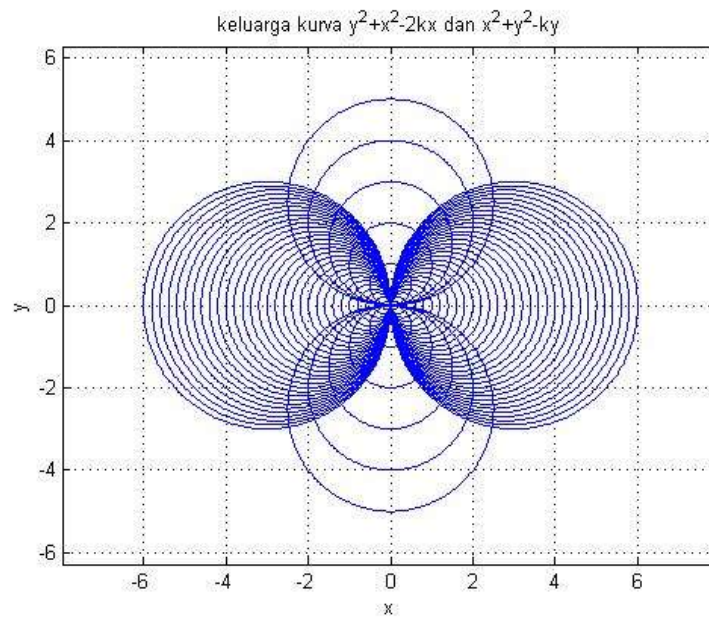
$$y-(2*((-1/Dy)*((-1/Dy)-((-1/Dy)^2+1)^{(1/2)})*x+x)*x-x^2)^{(1/2)}=0$$

f1 =

$$y^2+x^2-2*k*x$$

f2 =

$$x^2+y^2-k*y$$



Tugas No.3

```
%Program MATLAB untuk kurva y=kx%
clear all;
clc;
syms x y k

y=k*x
dy=diff('k*x','x')
k=solve('dy=k','k')
edif=subs('y-k*x=0','k',k)
edif_ortog=subs(edif,'dy','-1/Dy')

Dy=solve(edif_ortog,'Dy')
y_ortog=dsolve('Dy=-x/y','x')

figure
for C1=1:6
ezplot(eval(y_ortog(1)),[-3,3])
axis square
axis equal
hold on
grid on
end

for C1=1:6
ezplot(eval(y_ortog(2)),[-3,3]),...
axis square
axis equal
hold on
grid on
end

for k=-1.25:0.25:1.25
ezplot(eval(y),[-3,3]),...
hold on
grid on
end

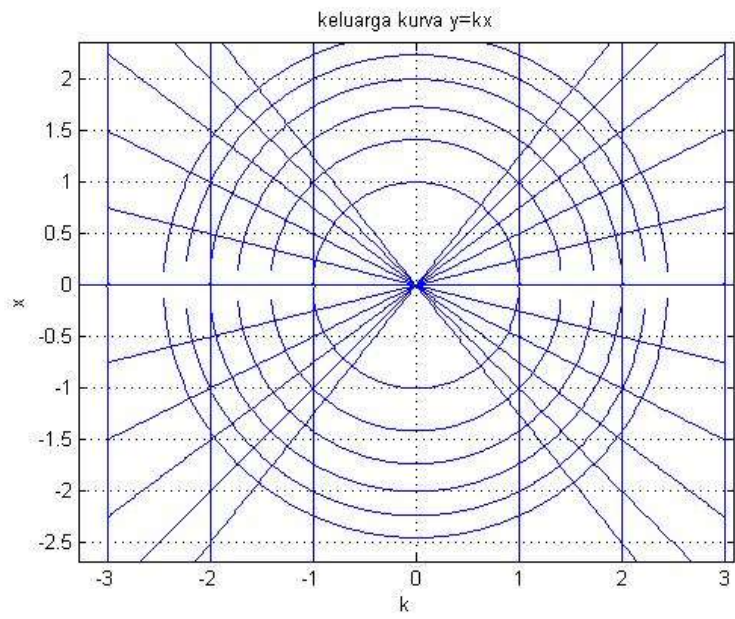
f1='k*x-y'
for k=1:1:10
ezplot(eval(f1))
axis square
axis equal
hold on
grid on
end

for k=-10:1:-1
ezplot(eval(f1))
axis square
axis equal
hold on
grid on
end
```

```
title('keluarga kurva y=kx')
```

Output MATLAB

```
y =  
    k*x  
  
dy =  
    k  
  
k =  
    dy  
  
edif =  
    y-dy*x=0  
  
edif_ortog =  
    y-(-1/Dy)*x=0  
  
Dy =  
    -x/y  
  
y_ortog =  
    (-x^2+C1)^(1/2)  
    -(-x^2+C1)^(1/2)  
  
f1 =  
    k*x-y
```



Tugas No. 4

```
clear all;
clc;
syms x y k

y=k/(1+x^2)
dy=diff('k/(1+x^2)', 'x')
k=solve('dy=-(2*k*x)/(x^2 + 1)^2', 'k')
edif=subs('y-k/(1+x^2)=0', 'k', k)
edif_ortog=subs(edif, 'dy', '-1/Dy')

Dy=solve(edif_ortog, 'Dy')
y_ortog=dsolve('Dy =(x^2 + 1)/(2*x*y)', 'x')

edif_y_ortog=subs(y_ortog, 'x', abs(x))

figure
for k=-1.25:0.25:1.25
    ezplot(eval(y), [-3,3])
    hold on
    grid on
end

for C1=1:6
    ezplot(eval(edif_y_ortog(1)), [-3,3])
    axis square
    axis equal
    hold on
    grid on
end

for C1=1:6
    ezplot(eval(edif_y_ortog(2)), [-3,3])
    axis square
    axis equal
    hold on
    grid on
end

title('keluarga kurva y=k/(1+x^2) dan trayektori ortogonalnya')
```

Output MATLAB

```
y =
    k/(1+x^2)

dy =
    -2*k/(1+x^2)^2*x
```

k =

$$-1/2 * dy * (1+x^2)^2 / x$$

edif =

$$y + 1/2 * dy * (1+x^2) / x = 0$$

edif_ortog =

$$y + 1/2 * (-1/Dy) * (1+x^2) / x = 0$$

Dy =

$$1/2 * (1+x^2) / y / x$$

y_ortog =

$$1/2 * (4 * \log(x) + 2 * x^2 + 4 * C1)^{1/2}$$

$$-1/2 * (4 * \log(x) + 2 * x^2 + 4 * C1)^{1/2}$$

edif_y_ortog =

$$1/2 * (4 * \log(\text{abs}(x)) + 2 * \text{abs}(x)^2 + 4 * C1)^{1/2}$$

$$-1/2 * (4 * \log(\text{abs}(x)) + 2 * \text{abs}(x)^2 + 4 * C1)^{1/2}$$

