MATH 151 Lab 5

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```
import sympy as sp
from sympy.plotting import (plot,plot_parametric,plot_implicit)
```

Question 1

1a

```
#finds values of k that will be a solution to diff equation
t = sp.symbols('t',real=True)
k = sp.symbols('k',real=True)
y = sp.cos(k*t)
dx = sp.diff(y,t,6)
diff_eq = dx + 64*y
k_value = sp.solve(diff_eq-0,k)
display(k_value)
```

```
[-2, 2, pi/(2*t), 3*pi/(2*t)]
```

1b

```
#verify if family functions are a solution
A = sp.symbols('A',real=True)
B = sp.symbols('B', real=True)
y2 = A*sp.sin(k*t)+ B*sp.cos(k*t)
dx2 = sp.diff(y2,t,6)
diff_eq2 = dx2 + 64*y2
display(dx2)
for value in k_value:
  if diff_eq2.subs(k,value) == 0:
    print(f"{value} is a valid answer")
```

$$-k^{6} \left(A \sin\left(kt\right) + B \cos\left(kt\right)\right)$$

```
-2 is a valid answer
2 is a valid answer
```

Question 2

2a

```
#finds the derivative
x = sp.symbols('x')
y = sp.symbols('y')
f = x**3 + 3 * x**2 - y**2
dydx = sp.idiff(f,y,x)
display(dydx)
```

$$\frac{3x\left(\frac{x}{2} + 1\right)}{y}$$

2b

```
#finds the tan line
slope1 = dydx.subs([(x,1),(y,-2)])
x1, y1 = 1, -2
y = -2 + slope1 * (x-1)
display(y)
```