1-

a)

  syms a b y(x)

dsolve(diff(y) ==2*x, y(0) == 1)

ans =

  x^2 + 1

b)

(i)syms x

>> simplify(cos(x)^2 + sin(x)^2)

  ans =

  1

(ii)sinh(3)*sin(39)*log(66)/exp(5)

ans =

    0.2726

2-

a),b),c)

```
function x=newton(x0,tol,n)
x(1)=x0;
for i=1:n
    x(i+1)=x(i)-f(x(i))/df(x(i));
    if abs(x(i+1)-x(i))<tol
        break
    end
    x(i)=x(i+1);
end
x=x(i+1);
function y=f(x)
y=x*exp(x)-2;
function z=df(x)
z=x*exp(x)+exp(x);
```

>> approx=newton(0.5,10^-5,45)

approx =

    0.8526

\>\> exact=vpa(solve(x*exp(x)-2))

  exact =

  0.85260550201372549134647241469532

  \>\> error=abs(exact-approx)

  error =

  0.0000000000000000044457228535359600017623380129544

3-

a),b),c)

```
function r=trapz(x0,xn,n)
h=(xn-x0)/n;
s=0;
for i=1:n-1
    x(i)=x0+i*h;
    s=s+f(x(i));
end
r=(h/2)*(f(x0)+f(xn)+2*s);
function t=f(x)
t=x*cos(x);
```

\>\> approx=trapz(0,pi,20)

approx =

    -2.0041

\>\> exact=int(x*cos(x),x,0,pi)

  exact =

  -2

  \>\> error=vpa(abs(exact-approx))

error =

0.0041174135290669156006515549961478