(1)

```
function Product = matrix_trans(B)
a = [2 0 0 0; 0 1 0 0; 0 0 1 0; 0 0 0 1]; %right
b = [1 0 0 0; 0 1 0 0; 0 0 1/2 0; 0 0 0 1]; %left
c = [1 0 1 0; 0 1 0 0; 0 0 1 0; 0 0 0 1]; %left
d = [0 0 0 1; 0 1 0 0; 0 0 1 0; 1 0 0 0]; %right
e = [1 -1 0 0; 0 1 0 0; 0 -1 1 0; 0 -1 0 1]; %left
f = [1 0 0 0; 0 1 0 0; 0 0 1 1; 0 0 0 0]; %right
g = [0 0 0 0; 0 1 0 0; 0 0 1 0; 0 0 0 1]; %right

Product = e * c * b * B * a * d * f * g;

% or otherwise
A = e * c * b, C = a * d * f * g;
Product = A * B * C;
end
```

(2)

```
syms x1 x2 x3
eq1 = 2 * x1 + x2 + x3 - 4;
eq2 = x1 + 3 * x2 + 2 * x3 - 6;
eq3 = x1 + 2 * x2 + 2 * x3 - 5;
[x1, x2, x3] = solve(eq1, eq2, eq3, x1, x2, x3);
A = [2, 1, 1; 1, 3, 2; 1, 2, 2];
x = [x1, x2, x3];
A * x'
```

Finding that the result is [4, 6, 5] which is correct.

(3)

```
A = [2 -3 1 3; 4 1 -1 5; 1 1 0 6; -7 0 0 9];
norm(A, 1)
norm(A, 2)
norm(A, inf)
norm(A, 'fro')

% Verify 3.3
x = [1, 2, 3, 4];
norm(x, inf), norm(x, 2)
norm(x, 2), 2 * norm(x, inf)
norm(A, inf), 2 * norm(A, 2)
norm(A, 2), 2 * norm(A, inf)
```

(4)

```
A = [1 2; 2 2; 2 1];
[U, S, V] = svd(A)
```

The result is as follows:

```
U =
    -0.5145    0.7071    0.4851
    -0.6860         0   -0.7276
    -0.5145   -0.7071    0.4851

S =
     4.1231         0
          0    1.0000
          0         0

V =
    -0.7071   -0.7071
    -0.7071    0.7071
```

(5)

```
x = -1:0.05:1;
y1 = exp(x);
y2 = 3 * exp(-10 * x .^ 2);
plot(x, y1)
hold on
plot(x, y2)
xlabel('x on [-1,1]'), ylabel('value of function')
title('plot for two exp functions')
legend('exp(x)', '3*exp(-10x^2)')
```