

```
%% Problem 1
disp("-----" )
disp("Problem 1")
disp("-----" )
v = [3;4];
%%a)
p = pi/3;
A = [cos(p), -sin(p); sin(p), cos(p)]
A*v
%%b)
B = [4,0;0,1]
B*v
%%c)
A*B
B*A
%%d)
disp("The commutative property does not hold true when applying multiple " ...
    + newline + "transformations to a point.")
disp("We can see this in problem c, as AB DNE BA like the commutative " ...
    + newline + "property says it should.")
clear;
%% Problem 2
format rat
disp("-----" )
disp("Problem 2")
disp("-----" )
%%a)
A = [1,1,1;5,2,1;2,-1,1];
invA = inv(A)
%%b)
B = [-4;0;15];
invA * B
%%c)
X = [A eye(3)];
Y = rref(X)
%%d)
inverse = Y(:,4:6)
clear;
%% Problem 3
format rat
disp("-----" )
disp("Problem 3")
disp("-----" )
%%a)
A = [3,1,1,-4,3;
     5,1,1,2,0;
     1,-1,1,-15,0;
     3,1,5,-8,0;
     5,-1,1,3,1];
%%b)
```

```

determinant = det(A)
%%c)
1/determinant
disp("Since we found that  $\det(A) = -2128$ , which is non zero meaning that A is " ...
    + newline + "invertible. The relationship between  $\det(A)$  and  $\det(A^{-1})$  is " ...
    + newline + "as follows:  $\det(A^{-1}) = 1/\det(A)$ ." + newline)
%%d)
disp("We can determine the value of  $\det((A^{-1})(B^2))$  using the following three " +
newline + ...
    "properties: Multiplicative Property, Triangle Matrix Property and the " + newline
+...
    "Inverse formula for determinants. We can first use the multiplicative " + newline
+...
    "property to split up  $\det((A^{-3})(B^2))$  giving us  $\det(A^{-3})$  times  $\det(B^2)$ ." +
newline +...
    "We used the Inverse formula for determinants to find  $\det(A^{-1})$  in part c, " +
newline +...
    "Since we know what  $\det(A^{-1})$  is so we can cube this result to get  $\det(A^{-3})$ ," +
newline +...
    "which is  $(-1/2128)^3$  or  $(-1/9636401152)$ . We can see that B is a lower " + newline
+...
    "triangular matrix, which means that  $\det(B)$  is the product of its diagonal " +
newline +...
    "entries. Multiplying the diagonal entries we get  $(-24)$ , which can be " + newline
+...
    "squared to find  $\det(B^2)$  or  $(576)$ . Finally we have  $(-1/2128)^3 * (576)$  " + newline
+...
    "or  $(-9/150568768)$ ." )
clear;
%% Problem 4
format rat
disp("-----" )
disp("Problem 4")
disp("-----" )
%%a)
syms x
A = [2*x+1, x, x+2;
     x+2, -2*x, -x-3;
     2*x-1, x, 3*x];
%%b)
determinant = det(A);
xVals = solve(determinant == 0, x)
clear;

```