Problem 1

```matlab
% Problem 1
A = rand(10, 10);
B = rand(10, 10);
C = A * B;
D = B' * A';
E = inv(B) * inv(A);
DCT = max(max(abs(D - C')))
```

```
DCT = 4.4409e-16
```

```matlab
ECINV = max(max(abs(E - inv(C))))
```

```
ECINV = 6.8390e-14
```

Problem 2

```matlab
% Problem 2
A = rand(6, 6);
AINV = rref([A eye(6)]);
D = AINV(:,7:12);
INVDIFF = max(max(abs(D - inv(A))))
```

```
INVDIFF = 3.6082e-16
```

Problem 3

```matlab
% Problem 3
A = rand(7, 7);
b = rand(7,1);
xINV = A \ b;
xREF = rref([A b]);
xREF = xREF(:,8);
xDIFF = max(max(abs(xINV - xREF)))
```

```
xDIFF = 2.2204e-16
```

Problem 4

```matlab
% Problem 4
A = rand(7, 7);
B = rand(7, 7);
disp("det(AB) = det(A)det(B) : ")
```

```
det(AB) = det(A)det(B) :
```

```matlab
disp((det(A * B) - det(A) * det(B)))
```

```
    -1.9922e-18
```

```
disp("det(A + B) = det(A) + det(B) : ")
```

```
 det(A + B) = det(A) + det(B) :
```

```
disp(det(A + B) - (det(A) + det(B)))
```

```
    -0.1304
```

```
disp("det(A^-1) = 1 / det(A) : ")
```

```
 det(A^-1) = 1 / det(A) :
```

```
disp((det(inv(A)) - (1 / det(A))))
```

```
    2.4869e-14
```

```
disp("det([A 0; 0 B]) = det(A) * det(B) : ")
```

```
 det([A 0; 0 B]) = det(A) * det(B) :
```

```
disp((det([A eye(7); eye(7) B]) - (det(A) * det(B))))
```

```
    7.0762
```

Problem 5

```
% Problem 5
for i=1:5
    A = rand(4, 5);
    TA = det(A' * A)
    AT = det(A * A')
end
```

```
 TA = -2.4955e-19
 AT = 0.0026
 TA = -1.0742e-17
 AT = 0.0914
 TA = 2.1636e-17
 AT = 0.3890
 TA = -4.5934e-19
 AT = 0.0200
 TA = -3.0524e-19
 AT = 0.0185
```

```
disp("When A is a reactangular matrix with more columns than rows, A' * A will" + ...
    " have a determinant of 0 and will not be invertible whereas A * A' will not" + ...
    " and will be invertible.")
```

When A is a reactangular matrix with more columns than rows, A' * A will have a determinant of 0 and will not be in

Problem 6

```
% Problem 6
A = [1, 1, 1;
     1, 2, 2;
     1, 2, 3;];
B = [1, 1, 1, 1;
     1, 2, 2. 2;
     1, 2, 3, 3;
     1, 2, 3, 4;];
C = [1, 1, 1, 1, 1;
     1, 2, 2. 2, 2;
     1, 2, 3, 3, 3;
     1, 2, 3, 4, 4;
     1, 2, 3, 4, 5];
detA = det(A)
```

```
detA = 1
```

```
detB = det(B)
```

```
detB = 1
```

```
detC = det(C)
```

```
detC = 1
```

```
disp("The determinant of the nxn matrix would be 1.")
```

```
The determinant of the nxn matrix would be 1.
```

```
disp("Confirm your guess by using row operations to evaluate that determinant")
```

```
Confirm your guess by using row operations to evaluate that determinant
```

Problem 7

```
% Problem 7
V = rand(10, 10);
U = eye(10) + 1000 * triu(V, 1);
detU = det(U)
```

```
detU = 1
```

```
detUT = det(U')
```

```
detUT = -3.9117e+03
```

3

```
detUdetUT = det(U*U')
```

detUdetUT = -4.2487e+28