

## Exercise 4

```
format
type areavol
```

```
%Creates the function 'areavol'
function D = areavol(A)

% Variable to determine if parallelogram or parallelepiped
isParallelogram = 0;

% Gets the number of columns to detect different vectors
% If it's 2 then it will be parallelogram, otherwise it's a parallelepiped
if isequal(size(A,2),2)
    isParallelogram = 1;
end

% Checks if linearly dependent
r = rank(A); % gets the rank
[rows, ~] = size(A); % gets the number of rows

% rows > rank, so these vectors are not independent.
if rows > r
    if isequal(isParallelogram, 1) % Cannot be built - parallelogram
        disp('Parallelogram cannot be built.');
```

else % Cannot be built - parallelepiped

```
        disp('Parallelepiped cannot be built.');
```

end

```
    D = 0; %Assigns empty output to D and terminates program
    return;
end

D = abs(det(A)); % gets the determinant

if isequal(isParallelogram, 1) % if parallelogram, outputs area
    disp('The area of the parallelogram is');
```

else % if parallelepiped, outputs volume

```
    disp('The volume of the parallelepiped is');
```

end

```
end
```

```
A=randi(10,2)
```

```
A = 2x2
     5     7
    10     7
```

```
D=areavol(A)
```

```
The area of the parallelogram is
D = 35
```

```
A=fix(10*rand(3))
```

```
A = 3x3
     8     1     0
     8     2     4
     5     8     1
```

```
D=areavol(A)
```

```
The volume of the parallelepiped is
```

```
D = 228
```

```
A=magic(3)
```

```
A = 3×3
     8     1     6
     3     5     7
     4     9     2
```

```
D=areavol(A)
```

```
The volume of the parallelepiped is
D = 360
```

```
B=randi([-10,10],2,1); A = [B,3*B]
```

```
A = 2×2
    10    30
     4    12
```

```
D=areavol(A)
```

```
Parallelogram cannot be built.
D = 0
```

```
X=randi([-10,10],3,1);Y=randi([-10,10],3,1);A=[X,Y,X-Y]
```

```
A = 3×3
     0     4    -4
    -1   -10     9
    -9    -9     0
```

```
D=areavol(A)
```

```
Parallelepiped cannot be built.
D = 0
```