Question 1:
A = {'a', 'd', 'c', 'b'} B = {'v', 'z', 'w', 'x', 'y'} f = {('a', 'z'), ('b', 'y'), ('d', 'w'), ('c', 'x')}
Is a function
Is injective
Not surjective
Not bijective therefore no inverse

A = {'a', 'd', 'c', 'b'} B = {'z', 'x', 'y'} f = {('a', 'z'), ('b', 'y'), ('c', 'x'), ('d', 'z')}
Is a function
Not injective
Is surjective
Not bijective therefore no inverse

A = {'a', 'd', 'c', 'b'} B = {'w', 'z', 'x', 'y'} f = {('a', 'z'), ('b', 'y'), ('d', 'w'), ('c', 'x')}
Is a function
Is injective
Is surjective
Is bijective Inverse of f is {('x', 'c'), ('w', 'd'), ('z', 'a'), ('y', 'b')}

A = {'a', 'd', 'c', 'b'} B = {1, 2, 3, 4, 5} f = {('c', 1), ('a', 4), ('b', 5), ('d', 3)}
Is a function
Is injective
Not surjective
Not bijective therefore no inverse

A = {'a', 'c', 'b'} B = {1, 2, 3, 4} f = {('a', 3), ('b', 4), ('c', 1)}
Is a function
Is injective
Not surjective
Not bijective therefore no inverse

A = {'a', 'd', 'c', 'b'} B = {1, 2, 3} f = {('c', 3), ('b', 1), ('d', 2), ('a', 2)}
Is a function
Not injective
Is surjective
Not bijective therefore no inverse

A = {'a', 'd', 'c', 'b'} B = {1, 2, 3, 4} f = {('a', 4), ('c', 3), ('b', 1), ('d', 2)}
Is a function
Is injective
Is surjective
Is bijective Inverse of f is {(1, 'b'), (2, 'd'), (3, 'c'), (4, 'a')}

A = {'a', 'd', 'c', 'b'} B = {1, 2, 3, 4} f = {('a', 2), ('c', 2), ('b', 1), ('d', 3)}
Is a function
Not injective
Not surjective
Not bijective therefore no inverse

A = {'a', 'c', 'b'} B = {1, 2, 3, 4} f = {('a', 4), ('c', 3), ('b', 1), ('a', 2)}
Not a function therefore not injective, surjective or bijective

Question 2:
Steps for gcd(414,662)
662/414 = 1 R 248
414/248 = 1 R 166
248/166 = 1 R 82
166/82 = 2 R 2
82/2 = 41 R 0
GCD(414, 662) = 2

Steps for gcd(6,14)
14/6 = 2 R 2
6/2 = 3 R 0
GCD(6, 14) = 2

Steps for gcd(24,36)
36/24 = 1 R 12
24/12 = 2 R 0
GCD(24, 36) = 12

Steps for gcd(12,42)
42/12 = 3 R 6
12/6 = 2 R 0
GCD(12, 42) = 6

Steps for gcd(252,198)
252/198 = 1 R 54
198/54 = 3 R 36
54/36 = 1 R 18
36/18 = 2 R 0
GCD(252, 198) = 18

Question 3:
3a:
Product Sum format:
662 = 414*1 + 248
414 = 248*1 + 166
248 = 166*1 + 82
166 = 82*2 + 2
82 = 2*41 + 0

Euclid backwards format:
2 = 1 * 166 - 2 * 82
2 = 1 * 166 - 2 * (248-1*166)
2 = 3 * 166 - 2 * 248
2 = 3 * (414-1*248) - 2 * 248
2 = 3 * 414 - 5 * 248
2 = 3 * 414 - 5 * (662-1*414)
2 = 8 * 414 - 5 * 662
GCD(662, 414) = 8 * 414 - 5 * 662

3b:
Product Sum format:

14 = 6*2 + 2
6 = 2*3 + 0

Euclid backwards format:
2 = 1 * 14 - 2 * 6
GCD(14, 6) = 1 * 14 - 2 * 6

3c:
Product Sum format:
36 = 24*1 + 12
24 = 12*2 + 0

Euclid backwards format:
12 = 1 * 36 - 1 * 24
GCD(36, 24) = 1 * 36 - 1 * 24

3d:
Product Sum format:
42 = 12*3 + 6
12 = 6*2 + 0

Euclid backwards format:
6 = 1 * 42 - 3 * 12
GCD(42, 12) = 1 * 42 - 3 * 12

3e:
Product Sum format:
252 = 198*1 + 54
198 = 54*3 + 36
54 = 36*1 + 18
36 = 18*2 + 0

Euclid backwards format:
18 = 1 * 54 - 1 * 36
18 = 1 * 54 - 1 * (198-3*54)
18 = 4 * 54 - 1 * 198
18 = 4 * (252-1*198) - 1 * 198
18 = 4 * 252 - 5 * 198
GCD(252, 198) = 4 * 252 - 5 * 198

Question 4:
4a:
q1 = 1 q2 = 1 q3 = 1 q4 = 2 q5 = 41
s0 = 1 s1 = 0 s2 = s0 - s1*q1 = 1 - 0*1 = 1 s3 = s1 - s2*q2 = 0 - 1*1 = -1 s4 = s2 - s3*q3 = 1 - -1*1 = 2 s5 = s3 - s4*q4 = -1 - 2*2 = -5
t0 = 0 t1 = 1 t2 = t0 - t1*q1 = 0 - 1*1 = -1 t3 = t1 - t2*q2 = 1 - -1*1 = 2 t4 = t2 - t3*q3 = -1 - 2*1 = -3 t5 = t3 - t4*q4 = 2 - -3*2 = 8
2 = -5*662 + 8*414
GCD(662, 414) = -5*662 + 8*414

4b:

```
q1 = 2            q2 = 3
s0 = 1            s1 = 0            s2 = s0 - s1*q1 = 1 - 0*2 = 1
t0 = 0            t1 = 1            t2 = t0 - t1*q1 = 0 - 1*2 = -2
2 = 1*14 + -2*6
GCD(14, 6) = 1*14 + -2*6
```

```
4c:
q1 = 1            q2 = 2
s0 = 1            s1 = 0            s2 = s0 - s1*q1 = 1 - 0*1 = 1
t0 = 0            t1 = 1            t2 = t0 - t1*q1 = 0 - 1*1 = -1
12 = 1*36 + -1*24
GCD(36, 24) = 1*36 + -1*24
```

```
4d:
q1 = 3            q2 = 2
s0 = 1            s1 = 0            s2 = s0 - s1*q1 = 1 - 0*3 = 1
t0 = 0            t1 = 1            t2 = t0 - t1*q1 = 0 - 1*3 = -3
6 = 1*42 + -3*12
GCD(42, 12) = 1*42 + -3*12
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4e:
q1 = 1            q2 = 3            q3 = 1            q4 = 2
s0 = 1            s1 = 0            s2 = s0 - s1*q1 = 1 - 0*1 = 1      s3 = s1 -
s2*q2 = 0 - 1*3 = -3          s4 = s2 - s3*q3 = 1 - -3*1 = 4
t0 = 0            t1 = 1            t2 = t0 - t1*q1 = 0 - 1*1 = -1           t3 =
t1 - t2*q2 = 1 - -1*3 = 4          t4 = t2 - t3*q3 = -1 - 4*1 = -5
18 = 4*252 + -5*198
GCD(252, 198) = 4*252 + -5*198
```