

1) Problem One

- a) Is a function
- b) Is injective
- c) N/A

-
- a) Is a function
 - b) Is surjective
 - c) N/A

-
- a) Is a function
 - b) Is bijective
 - c) $\{('y', 'b'), ('x', 'c'), ('w', 'd'), ('z', 'a')\}$

-
- a) Is a function
 - b) Is injective
 - c) N/A

-
- a) Is a function
 - b) Is injective
 - c) N/A

-
- a) Is a function
 - b) Is surjective
 - c) N/A

-
- a) Is a function
 - b) Is bijective
 - c) $\{(1, 'b'), (2, 'd'), (4, 'a'), (3, 'c')\}$

-
- a) Is a function
 - b) Is neither injective nor surjective
 - c) N/A

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- a) Not a function
 - b) N/A
 - c) N/A

2) Problem Two

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
 $\gcd(414, 662) = 2$

14/6 = 2 R 2
6/2 = 3 R 0
 $\gcd(6, 14) = 2$

36/24 = 1 R 12
24/12 = 2 R 0
 $\gcd(24, 36) = 12$

42/12 = 3 R 6
12/6 = 2 R 0
 $\gcd(12, 42) = 6$

252/198 = 1 R 54
198/54 = 3 R 36
54/36 = 1 R 18
36/18 = 2 R 0
 $\gcd(252, 198) = 18$

3) Problem Three

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662 = 414 * 1 + 248
414 = 248 * 1 + 166
248 = 166 * 1 + 82
166 = 82 * 2 + 2
82 = 2 * 41 + 0
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(414, 662) = (8 * 414) + (-5 * 662)

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14 = 6 * 2 + 2
6 = 2 * 3 + 0
2 = 1 * 14 - 2 * 6
gcd(6, 14) = (-2 * 6) + (1 * 14)

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36 = 24 * 1 + 12
24 = 12 * 2 + 0
12 = 1 * 36 - 1 * 24
gcd(24, 36) = (-1 * 24) + (1 * 36)

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42 = 12 * 3 + 6
12 = 6 * 2 + 0
6 = 1 * 42 - 3 * 12
gcd(12, 42) = (-3 * 12) + (1 * 42)

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252 = 198 * 1 + 54
198 = 54 * 3 + 36
54 = 36 * 1 + 18
36 = 18 * 2 + 0
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)

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4) Problem Four

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q0 = 1, q1 = 1, q2 = 1, q3 = 2, q4 = 41,
s0 = 1, s1 = 0, s2 = 1 - 1 * 0 = 1, s3 = 0 - 1 * 1 = -1, s4 = 1 - 1 * -1 = 2, s5
= -1 - 2 * 2 = -5,
t0 = 0, t1 = 1, t2 = 0 - 1 * 1 = -1, t3 = 1 - 1 * -1 = 2, t4 = -1 - 1 * 2 = -3,
t5 = 2 - 2 * -3 = 8,
gcd(414, 662) = (8 * 414) + (-5 * 662)

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q0 = 2, q1 = 3,
s0 = 1, s1 = 0, s2 = 1 - 2 * 0 = 1,
t0 = 0, t1 = 1, t2 = 0 - 2 * 1 = -2,
gcd(6, 14) = (-2 * 6) + (1 * 14)

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```

q0 = 1, q1 = 2,
s0 = 1, s1 = 0, s2 = 1 - 1 * 0 = 1,
t0 = 0, t1 = 1, t2 = 0 - 1 * 1 = -1,
gcd(24, 36) = (-1 * 24) + (1 * 36)

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q0 = 3, q1 = 2,
s0 = 1, s1 = 0, s2 = 1 - 3 * 0 = 1,

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t0 = 0, t1 = 1, t2 = 0 - 3 * 1 = -3,  
gcd(12, 42) = (-3 * 12) + (1 * 42)
```

```
q0 = 1, q1 = 3, q2 = 1, q3 = 2,  
s0 = 1, s1 = 0, s2 = 1 - 1 * 0 = 1, s3 = 0 - 3 * 1 = -3, s4 = 1 - 1 * -3 = 4,  
t0 = 0, t1 = 1, t2 = 0 - 1 * 1 = -1, t3 = 1 - 3 * -1 = 4, t4 = -1 - 1 * 4 = -5,  
gcd(252, 198) = (4 * 252) + (-5 * 198)
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