

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

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

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

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

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- 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
 $\gcd(414, 662) = 82$

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

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

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

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

3) Problem Three

$662 = 414 * 1 + 248$
 $414 = 248 * 1 + 166$
 $248 = 166 * 1 + 82$
 $166 = 82 * 2 + 2$
 $82 = 2 * 41 + 0$
 $2 = 1 * 166 - 2 * 82$
 $2 = 1 * 166 - 2 * (248 - 1 * 166)$
 $2 = 3 * 166 - 2 * 248$
 $2 = 3 * (414 - 1 * 248) - 2 * 248$
 $2 = 3 * 414 - 5 * 248$
 $2 = 3 * 414 - 5 * (662 - 1 * 414)$
 $2 = 8 * 414 - 5 * 662$
 $\text{gcd}(414, 662) = (8 * 414) + (-5 * 662)$

 $14 = 6 * 2 + 2$
 $6 = 2 * 3 + 0$
 $2 = 1 * 14 - 2 * 6$
 $\text{gcd}(6, 14) = (-2 * 6) + (1 * 14)$

 $36 = 24 * 1 + 12$
 $24 = 12 * 2 + 0$
 $12 = 1 * 36 - 1 * 24$
 $\text{gcd}(24, 36) = (-1 * 24) + (1 * 36)$

 $42 = 12 * 3 + 6$
 $12 = 6 * 2 + 0$
 $6 = 1 * 42 - 3 * 12$
 $\text{gcd}(12, 42) = (-3 * 12) + (1 * 42)$

 $252 = 198 * 1 + 54$
 $198 = 54 * 3 + 36$
 $54 = 36 * 1 + 18$
 $36 = 18 * 2 + 0$
 $18 = 1 * 54 - 1 * 36$
 $18 = 1 * 54 - 1 * (198 - 3 * 54)$
 $18 = 4 * 54 - 1 * 198$
 $18 = 4 * (252 - 1 * 198) - 1 * 198$
 $18 = 4 * 252 - 5 * 198$
 $\text{gcd}(252, 198) = (4 * 252) + (-5 * 198)$

4) Problem Four

$q_0 = 1, q_1 = 1, q_2 = 1, q_3 = 2, q_4 = 41,$
 $s_0 = 1, s_1 = 0, s_2 = s_0 - 1 * s_1 = 1, s_3 = s_1 - -1 * s_2 = -1, s_4 = s_2 - 2 * s_3 =$
 $2, s_5 = s_3 - -5 * s_4 = -5,$
 $t_0 = 0, t_1 = 1, t_2 = t_0 - -1 * t_1 = -1, t_3 = t_1 - 2 * t_2 = 2, t_4 = t_2 - -3 * t_3$
 $= -3, t_5 = t_3 - 8 * t_4 = 8,$
 $\text{gcd}(414, 662) = (8 * 414) + (-5 * 662)$

 $q_0 = 2, q_1 = 3,$
 $s_0 = 1, s_1 = 0, s_2 = s_0 - 1 * s_1 = 1,$
 $t_0 = 0, t_1 = 1, t_2 = t_0 - -2 * t_1 = -2,$
 $\text{gcd}(6, 14) = (-2 * 6) + (1 * 14)$

 $q_0 = 1, q_1 = 2,$
 $s_0 = 1, s_1 = 0, s_2 = s_0 - 1 * s_1 = 1,$
 $t_0 = 0, t_1 = 1, t_2 = t_0 - -1 * t_1 = -1,$
 $\text{gcd}(24, 36) = (-1 * 24) + (1 * 36)$

 $q_0 = 3, q_1 = 2,$
 $s_0 = 1, s_1 = 0, s_2 = s_0 - 1 * s_1 = 1,$

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t0 = 0, t1 = 1, t2 = t0 - -3 * t1 = -3,  
gcd(12, 42) = (-3 * 12) + (1 * 42)
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q0 = 1, q1 = 3, q2 = 1, q3 = 2,  
s0 = 1, s1 = 0, s2 = s0 - 1 * s1 = 1, s3 = s1 - -3 * s2 = -3, s4 = s2 - 4 * s3 =  
4,  
t0 = 0, t1 = 1, t2 = t0 - -1 * t1 = -1, t3 = t1 - 4 * t2 = 4, t4 = t2 - -5 * t3  
= -5,  
gcd(252, 198) = (4 * 252) + (-5 * 198)
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