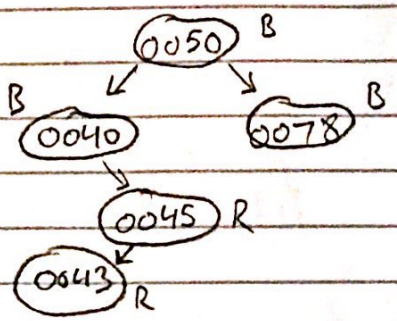
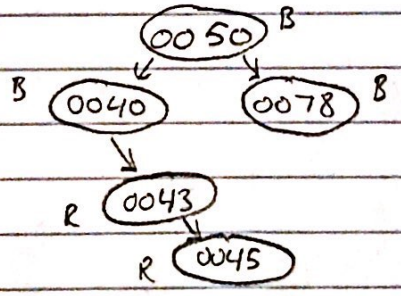
Edward Yaroslavsky 11/21/19 CS385 HW 5

I pledge my honor that I have abided by the Stevens Honor System. EY

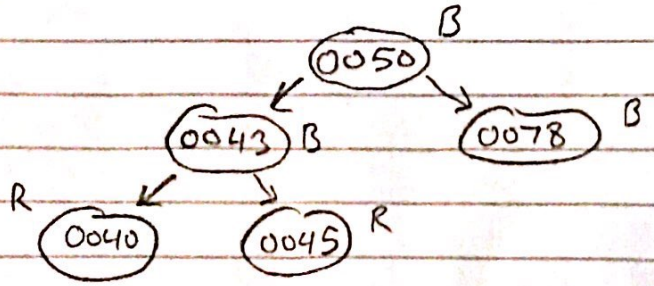
1a)



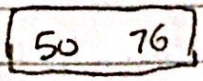
b) This violates the property that if a node is red, then both its children are black. This isn't the case for node 0045 and so the case seen after regular binary search tree insertion is 2b. The steps taken to fix the tree are to set z = p[z] and right-rotate z.

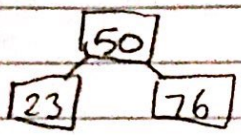


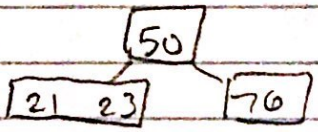
c) This violates the property that if a node is red, then both its children are black. This is not the case for node 0043 and so the case seen after first fixup is 3b. The steps taken to fix the tree are to set p[z].color to black, p[p[z]].color to red, and left-rotate p[p[z]].

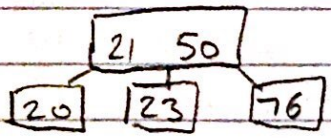


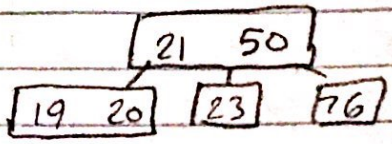
2a) 

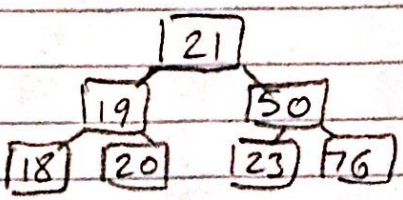
b) 

c) 

d) 

e) 

f) 

g) 

3)
```
int lcm = A[0];
for (int i = 0; i < n; i++) {
    lcm = (A[i] · lcm) / gcd(A[i], lcm);
}
return lcm;
```

4a) $p(x) = 4x^4 + 5x^3 - 2x^2 - 4x + 7$
$= x(4x^3 + 5x^2 - 2x - 4) + 7$
$= x(x(4x^2 + 5x - 2) - 4) + 7$
$= x(x(x(4x + 5) - 2) - 4) + 7$

b) $p = [7, -4, -2, 5, 4]$

c)

x	p	n	i
2	4	4	
2	13	4	3
2	24	4	2
2	44	4	1
2	95	4	0

$p(2) = 95$

d)

2	4	5	-2	-4	7
	↓	8	26	48	88
	4	13	24	44	95

$\Rightarrow 4x^3 + 13x^2 + 24x + 44 + \frac{95}{x-2}$

5) product ← 1
for i ← I down to 0 do
    product ← product * product
    if b_i = 1 product ← product * a
return product