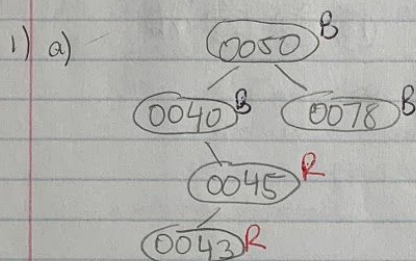Himanshu Rana
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CS 385 HW #5
"I pledge my honor that I have abided by the
Stevens Honor System" - Himanshu Rana

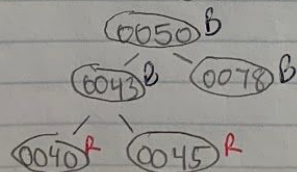1) a)

```
        (0050) B
         /        \
  (0040) B      (0078) B
         \
        (0045) R
         /
    (0043) R
```

b) Property violated: 4 - both parent and child are red (0045 & 0043)
   Case 2b
   Steps: 0043 = P[0043]
             right-rotate on 0043

```
    (0050) B
     /       \
 (0040) B   (0078) B
      \
     (0043) R
         \
        (0045) R
```
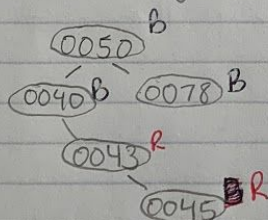
c) Property violated. 4 - both parent and child are red
   case: 3b
      Steps: 0043 = P[0043]
               left-rotate on 0043

```
      (0050) B
       /       \
   (0043) B   (0078) B
    /      \
(0040) R  (0045) R
```

2) a) (50)

b) (50 76)

c)
(50)
(23) (76)

d) (50)
(21 23) (76)

e) (21 50)
(20)(23) (76)

f) (21 50)
(19 20) (23) (76)

g)
(21)
(19) (50)
(18) (20) (23) (76)

3) LCM (A[1...n]) {
    int val = lcm (A[0][1]);
    for (int x = 2; x < n; ++x) {
        val = lcm (A[x]);
    }
    return val;

lcm (m,n) {
    return (m * n) / gcd (m, n);
}

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

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

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

c)

x	p	n		
2	4	4		$p(2) = 95$
	13	3		
	24	2		
	44	1		
	95	0		

d)

$$2 \; | \; \begin{array}{ccccc} 4 & 5 & -2 & -4 & 7 \\ & 8 & 26 & 48 & 88 \\ \hline 4 & 13 & 24 & 44 & 95 \end{array}$$

5) Left Right Binary Exponentiation (a, b(n)) {

  product ← a

  for i ← I-1 down to 0 do

   Product ← product * product

   if b_i =1 product ← product * a

  return product