Solutions to Quiz # 2 for Dr. Z.'s Number Theory Course for Oct. 3, 2013

1. (5 points) Use any method to find the proudct-of-prime-powers representation of

$$(3^3 \cdot 5^{98} \cdot 11^{14} \cdot 43) \cdot (3^2 \cdot 5^3 \cdot 11^{12} \cdot 13^2 \cdot 43^2) \quad .$$

Sol. of 1:

$$\begin{aligned}
&(3^3 \cdot 5^{98} \cdot 11^{14} \cdot 43) \cdot (3^2 \cdot 5^3 \cdot 11^{12} \cdot 13^2 \cdot 43^2) \\
&= (3^3 \cdot 5^{98} \cdot 11^{14} \cdot 13^0 \cdot 43^1) \cdot (3^2 \cdot 5^3 \cdot 11^{12} \cdot 13^2 \cdot 43^2) \\
&= 3^{3+2} \cdot 5^{98+3} \cdot 11^{14+12} \cdot 13^{0+2} \cdot 43^{1+2} \\
&= 3^5 \cdot 5^{101} \cdot 11^{26} \cdot 13^2 \cdot 43^3 \quad .
\end{aligned}$$

Ans. to 1: $3^5 \cdot 5^{101} \cdot 11^{26} \cdot 13^2 \cdot 43^3$.

2. (5 points) Use the clever way to find $Div(7007)$.

Sol. of 2:

$$7007 = 7^2 \cdot 11 \cdot 13$$

So

$$\begin{aligned}
Div(7007) &= \{1, 7, 7^2\} \cdot \{1, 11\} \cdot \{1, 13\} \\
\{1, 7, 7^2\} \cdot (\{1, 11\} \cdot \{1, 13\}) &= \{1, 7, 49\} \cdot (\{1, 11, 13, 143\} \\
&= \{1, 11, 13, 143, \\
&\quad 7, 77, 91, 1001, \\
&\quad 49, 539, 637, 7007\} \\
&\quad \{1, 7, 11, 13, 49, 77, 91, 143, 539, 637, 1001, 7007\} \quad .
\end{aligned}$$

Ans. to 2: $Div(7007) = \{1, 7, 11, 13, 49, 77, 91, 143, 539, 637, 1001, 7007\}$.