3. My integer is 401. 

Let $L = (a_0 + a_1 + \cdots + a_7)$, then 

$$L = 200 + 100 + 50 + 20 + 10 + 3 + 1 + 0 = 573.$$ 

4. Fix a plane $P: ax + by + cz + d = 0$. 

Suppose $b = 0$. Then $L = L(x, y)$ becomes 

$$L(x, y) = \min \{ \max (tx, ty) \mid x + y = 0 \} = \min \{ \max (tx, ty) \mid x + y = 0 \} = 0.$$ 

So $L(a_x, b_y) = \max (ax, by) = S(a_x, b_y)$.

5. With $c = 0$, the problem becomes

$$L(x, y) = \max (tx, ty) \quad (c=0).$$

Actually, $\bar{a}_c(0, 0) = \min (x, y) = -1$.

6. Suppose $b = 0$. Then $L(x, y) = \max (tx, ty)$. 

$$L(x, y) = \max (tx, ty) = \max (tx, ty) = x + y = 0.$$ 

So $L(a_x, b_y) = \max (ax, by) = S(a_x, b_y)$.
1. Strayer #70

Recall that 
\[ L_p(n^k) = k \cdot L_p(n) \]

(a) \[ a^2 \mid b^3 \Rightarrow \text{full divide} \]
\[ L_p(a^2) \leq k \cdot L_p(b^3) \; \text{; Nat is} \]
\[ 2 \cdot L_p(a) \leq 3 \cdot L_p(b) \]

Does this imply \( a \mid b \)?

No: \( L_p(a) \leq 2 \cdot L_p(b) \) does not imply \( a \mid b \)

In general, imply \( L_p(a) \leq L_p(b) \)

Rule to the point, cut
\[ a = p^3, b = p^2 \cdot \text{Now} \; (p^3)^2 = (p^2)^3 \]

so \( a^2 \mid b^3 \), but not \( a \mid b \)

(b) This case is trivial
\[ a^2 \mid b^3 \Rightarrow L_p(a^2) \leq L_p(b^3) \; \text{full divide} \]
\[ \Rightarrow \text{true} \; \text{This is} \; 2 \cdot L_p(a) \leq 2 \cdot L_p(b) \]
\[ \Rightarrow L_p(a) \leq L_p(b) \Rightarrow a \mid b \]

(c) If \( p \) is prime, then \text{if} \[ a^3 \Rightarrow L_p(a^3) \leq 4 \; \text{Nat is} \quad 3 \cdot L_p(a) \geq 4 \]
\[ 2 \cdot L_p(a) \geq \frac{4}{3} \]

Because \( L_p(a) \)

is an integer, the implies \( a \mid b \)

\[ \Rightarrow 2 \cdot p^3 \mid a \; \text{so} \; 'True'. \]

2. Suppose \( a \equiv b \mod m \)

Then \( a \) and \( b \) are in the same residue class by \( \text{mod} \; m \)

If \( \gcd(a, m) \), then \( \gcd(b, m) \),

Thus if \( d = \gcd(a, m) \), then \( \gcd(b, m) \). Thus,
\[ \gcd(a,m) \bigg| \gcd(b,m) \bigg| \text{for some } \gcd(a,m) \bigg| \gcd(b,m) \bigg| \text{. Thus,} \]

\[ \gcd(a,m) \bigg| \gcd(b,m) \bigg| \text{. Also sketch} \]

a \[ \text{and} \; b. \quad \text{Least common multiple} \; \text{gives} \]

\[ 110 = 2 \cdot 5 \cdot 11 \]