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This test represents my own work, during the exam:

1. I have not used notes or books
2. I have not consulted others
3. I have not used any type of digital media.

Signature: Abrar

1. $Z = 320A - 10A^2 + 20AB - 20B^2 + 160B - 70$

$Z_A = 320 - 20A + 20B$

$Z_{AA} = -20$

$Z_{AB} = 20$

$Z_B = 20A - 40B + 160$

$Z_{BB} = -40$

for finding profit maximizing outputs we have to find the critical points.

So,

$Z_A = 0$

$\Rightarrow 320 - 20A + 20B = 0$

$\Rightarrow 16 - A + B = 0$

$\Rightarrow A = B + 16 \quad \ldots (i)$

again, $Z_B = 0$

$\Rightarrow 20A - 40B + 160 = 0$

$\Rightarrow A - 2B + 8 = 0$

$\Rightarrow B + 16 - 2B + 8 = 0$ [as $A = B + 16$ from (i)]

$\Rightarrow B = 24$

So, $A = 40$

So, the profit maximizing level of output of the two goods is $A = 40$ and $B = 24$.

2. here,

$z_{AA} < 0$

$z_{BB} < 0$

and $z_{AA} \times z_{BB} > (z_{AB})^2$

so, we can say that profits are maximized.

3. Maximized amount of profit $= 320 \times 40 - 10 \times 40^2 + 20 \times 40 \times 24 - 20 \times 24^2 + 160 \times 24 - 70$

$= 8250$ (Ans)