36 The demand function for a product is $280 - 4x - x^2$ and the supply function for it is $p = 160 + 4x + x^2$. Find the producers surplus.

Eq. part: $280 - 4x - x^2 = 160 + 4x + x^2$

$-280 \quad +4x \quad +x^2 \qquad -280 + 4x \quad +x^2$

$\longrightarrow 2x^2 + 8x - 120 = 0$

$x^2 + 4x - 60 = 0$

$(x+10)(x-6) = 0$

$x = -10, 6$

$(6, 220)$

$$PS = 6(220) - \int_0^6 (160 + 4x + x^2)\,dx$$

$$= 1320 - \left[160x + \frac{4x^2}{2} + \frac{x^3}{3}\right]_0^6$$

$$= 1320 - \left[160(6) + 2(6)^2 + \frac{6^3}{3}\right]$$

$$= 1320 - [1104]$$

$$= 216$$