2. At the current market equilibrium, the price of a good equals $40 and the quantity equals 10 units. At this equilibrium, the price elasticity of supply is 2.0. Assume that the supply schedule is linear.

a. **Use the price elasticity and market equilibrium to find the supply schedule. (Hint: the supply schedule has the following form: $q = a + (\Delta q/\Delta p)p$. First, find the value of $\Delta q/\Delta p$, and then, find the value of a.)**
b. **Calculate the producer surplus in the market.**
c. **Imagine that a policy results in price falling from $40 to $34. By how much does producer surplus fall?**
d. **What fraction of the lost producer surplus is due to the reduction in the quantity supplied and what fraction is due to the fall in price received per unit sold?**

2.a. elasticity = $(\Delta q/\Delta p)(p/q)$
$2.0 = (\Delta q/\Delta p)(40/10)$
$(\Delta q/\Delta p) = .5$, which is the slope of the supply schedule.

Assuming linearity, $q = a+.5p$
At the market equilibrium: $10 = a + (.5)(40)$
$a = -10$

Therefore, the supply schedule is $q = -10 + .5p$.

2.b. First, find the "inverse" supply schedule, which gives price as a function of quantity: $p = 20 + 2q$

Next, find the producer surplus as the area between the price line (p=$40) and the inverse supply schedule from quantity zero to quantity 10. Note that this area forms a triangle with height equal to the price minus the price at zero quantity (40-20=20) and base equal to the quantity (10). The area of the triangle is thus (.5)(20)(10) = $100. Therefore, the producer surplus in this market is $100.

2.c. Using the supply schedule, we see that at a price of $34, the quantity supplied falls to $q = -10+.5(34) = 7$ units.

The producer surplus is the area of the new triangle formed by the price line p = $34 and the inverse supply schedule from quantity zero to 7 units. The area of this triangle is (.5)(34-20)(7) = $49. Thus, the decline in price from $40 to $34 results in a loss of producer surplus of $100-$49 = $51.

2.d. The loss in producer surplus can be thought of as the area of the trapezoid formed by the original price line (p = $40), the new price line (p = $34), the price axis, and the segment of the inverse supply schedule between the old quantity (q = 10) and the new quantity (q = 7). This trapezoid can be divided into a rectangle over the quantity still supplied and a triangle over the quantity no longer supplied. The area of the rectangle is ($40-$34)(7) = $42 and the area of the triangle is (.5)($40-$34)(10-7) = $9. (Note that these amounts sum to $51, the total producer surplus loss.) Thus, $9 of the producer surplus loss is due to the reduction in the quantity sold and the remaining $42 of the loss is due to producers receiving less for each unit that they continue to sell.