4. Correct. The answer is true. To see why this is the case,

when λ=1: $\frac{y^{\lambda}-1}{\lambda}=\frac{y-1}{1}=y-1$

when λ= -1: $\frac{y^{-\lambda}-1}{-1}=\frac{1/y-1}{-1}=1-1/y$

when λ= 2: $\frac{y^{2}-1}{2}=\frac{y^{2}}{2}-\frac{1}{2}$

We have an even more interesting case when $\lambda \to 0$, then the function goes to ln(y)

$$\frac{y^{0}-1}{0}=\frac{1-1}{0}=\frac{0}{0}$$

In this case, our function is undefined. However, l'Hôpital, a clever Frenchman, has published the following relationship that allows us to figure out what the above function equals as $\lambda \to 0$. His rule says that if:

$$\lim_{x\to a} f(x)=0,\quad \lim_{x\to a} g(x)=0, \text{ and } \lim_{x\to a}\frac{f'(x)}{g'(x)}=L, \text{ then } \lim_{x\to a}\frac{f(x)}{g(x)}=L$$

So take the above Box-Cox function and take the derivative of the top and bottom with respect to λ:

$$\lim_{\lambda\to 0}\frac{\partial(y^{\lambda}-1)/\partial\lambda}{\partial\lambda/\partial\lambda}=\lim_{\lambda\to 0}\frac{y^{\lambda}\ln y}{1}=\ln y$$

Thus, the Box Cox transformation when $\lambda \to 0$, gives us the log function. We can put the Box-Cox transformation into a demand equation as follows:

$$\frac{Q^{\lambda}-1}{\lambda}=\beta_1+\beta_2\frac{P^{\lambda}-1}{\lambda}+\beta_3\frac{Y^{\lambda}-1}{\lambda}+\beta_4\frac{X^{\lambda}-1}{\lambda}$$

Where Q equals quantity demanded, Y equals income and X represents other variables related to demand. Techniques exist to econometrically choose the βs and the λ, or even to estimate a model with a different λ for each variable.