1. The labor demand function is determined by setting the real wage equal to the $MPN$:

$$w = MPN = 3 - .44N.$$ 

The equilibrium employment level can then be determined by substituting for the real wage in the labor supply function:

$$N = 125(3 - .44N) - 25.$$ 

Solving for the level of employment, one obtains $N = 6.25$, and then for the equilibrium real wage one obtains $w = 3 - .44(6.25) = 0.25$. Finally, substitute the equilibrium level of employment into the production function to obtain the associated equilibrium output level $Y = 19.28$.

2. Consider the wine-country shock as an adverse productivity shock, represented in our model by a decrease in the total factor productivity coefficient $A$. This implies a decrease in $MPN$ at any given level of $N$, and hence implies a downward shift in the labor demand curve. The labor supply curve does not shift. The implication is that the equilibrium levels of employment and the real wage decrease. As a result of the (exogenous) decrease in the productivity coefficient, together with the resulting decrease in the employment level (endogenous), equilibrium output in California falls as well.

I leave it to you to draw the appropriate labor market graph, showing the $ND$ curve shifting downward, the $NS$ curve not shifting, and the resulting drop in the equilibrium levels of employment and real wage.

Note: It is not sufficient in response to this question to draw only a graph of a movement in the production function.

3. (a) The equation required in answer to this part of the question is: $w = MPN$, or in nominal terms, $W = MRPN$.

(b) The condition is now: $w = MPN + s$. On the left-hand side, the “marginal cost” of an additional unit of labor, the real wage $w$, is unchanged.

To understand the change in the “marginal benefit”, given by the expression on the right-hand side, think of the firm as having an altered production function, namely, the production function: $Y = AF(K, N) + sN$, reflecting the fact that the firm receives $s$ units of real output for each additional unit of labor employed. The marginal benefit of hiring a little more labor, (think in terms of “one additional unit” of labor if that makes it clearer), is now given by the sum of the usual $MPN$ and $s$: $MPN + s$.

(c) The labor demand curve is determined in a way analogous to the way in which any demand curve is determined, and in particular, in a way that answers the question I wrote on the board in class: given any real wage, say $w = w_1$, what is the firm’s optimal choice of labor? It is the choice, say $N = N_1$, such that the relevant measure of marginal productivity, now given by the expression derived in part (b), is equal to $w_1$. That is, the labor demand curve is now coincident with the curve given by $MPN + s$. This amounts to
an upward shift in the labor demand curve from \( MPN \) to \( MPN + s \). This implies that the equilibrium levels of employment and real wage increase. (The labor supply curve does not shift.) I leave it to you to draw the appropriate labor market graph, showing the shift in the labor demand curve, the fixed labor supply curve, and the increase in the levels of employment and the real wage.

4. Making use of our model, if everyone gives the baseline answer: “same”, then one would expect to observe no change in current aggregate consumption or in current aggregate saving, and no indication of individuals in the aggregate planning changes in future consumption.

In contrast, if a substantial majority gives the answer: “better”, then making use of our model, one would expect to observe an increase in current aggregate consumption and a decrease in current aggregate private saving, and also some indication of plans to increase future consumption. (It is presumed in the answer given here that there is no change in government saving, so that any change in current aggregate private saving equals a corresponding change in current national saving.)

These conclusions regarding current consumption, current saving, and future consumption begin with an interpretation of the answer “better” in terms of something simple and relatively concrete: an expectation in the aggregate that disposable income will be higher one year from now. It follows from our model, which includes the assumption of forward-looking households and the assumption of a positive relation between expected future disposable income and desired future consumption (other things equal), that desired future consumption increases. Next, one brings to bear our assumption of the consumption-smoothing motive: other things equal, individuals prefer relatively smooth paths of consumption over time to “choppy” paths. This assumption implies that accompanying the increase in desired future consumption is an increase in desired current consumption so as to maintain a greater degree of smoothness in the overall consumption path.

Finally, on the basis of our model, we would expect to observe a decrease in current aggregate (private) saving. One can deduce this in a rigorous fashion from the relationship that a change in current disposable income (which is zero in the case at hand) is equal to the sum of the change in current consumption plus the change in current saving. Given that the former is positive, the latter must be negative. It should be noted that the content of this deductive sequence is in line with the consumption-smoothing motive.

A somewhat looser mode of inference is based on the consumption-smoothing motive but with the mathematical restriction used in the preceding paragraph not explicitly imposed (though with the discussion in the present paragraph consistent in spirit with the restriction in the preceding paragraph). The idea is that private saving (at least when considering changes in current or expected future income, other things equal) serves as a “vehicle” that facilitates consumption-smoothing. In the present case, where an individual wants to “bring forward” some of the expected future increase in disposable income from the future to the present in order to increase consumption in the present, the action whereby this is accomplished is a reallocation of current disposable income toward an increase in current consumption, and away from current saving.