Multiple Choice (2 points each)

1. a  
2. b  
3. b  
4. c  
5. c  
6. a  
7. b  
8. a  
9. c  
10. a, b (the wording was ambiguous)  
11. c  
12. d  
13. c  
14. d  
15. b  
16. d

Short Answer

1. (35 points)  
a. $12,000  
b. I will give you a figure on Monday.  
c. Utility is maximized at point A, where $w = MRS$. At any other point on the wage line, utility would be lower, and $w$ would not equal $MRS$.  
d. $18,000  
e. See the figure to be handed out.  
f. In my graph, labor supply fell. (The correct answer will depend on how you draw the figure.)  
g. See the figure to be handed out.  
h. In my graph, the income effect is greater than the substitution effect, which is why the total effect on labor supply is negative.  
i. In my graph, earnings increased. This is what will usually happen.  
j. The wage rate subsidy increases the labor supply of low-wage workers only if the substitution effect outweighs the income effect. If the income effect outweighs the substitution effect, labor supply will fall.  
k. Only those who work receive a benefit. Although this may be desirable, welfare programs have always provide benefits to individuals who are not in the labor force as well.
2. Gromit will want to change the mix of capital and labor. In equilibrium, 
   \( \text{MPK}/r = \text{MPL}/w \) (which is a way of rewriting \( w/r = \text{MPL}/\text{MPK} \)).
In the example, \( 180/100 < 140/70 \), so the equilibrium condition is not satisfied. To get closer to the equilibrium condition, you need to use more labor (to bring down MPL) or less capital (to increase MPK), or both.

3.a. MRTS = slope of the isoquant = 1/2.
b. \( \text{TC}/r = 150/($30/hour) = 5 \) units of capital 
   \( \text{TC}/w = 150/($30/hour) = 5 \) workers.
Given input prices and the total outlay of $150, 20 exercise machines is this producer's maximum hourly output. I will give you a figure on Monday.
c. \( \text{TC}/r = 150/($30/hour) = 5 \) units of capital 
   \( \text{TC}/w = 150/($10/hour) = 15 \) workers.
Given the new input prices and the total outlay of $150, 40 exercise machines is this producer's maximum hourly output. See the attached figure.
d, e, and f. The total effect is an increase of 15 workers (0 before, 15 after). Two-thirds of this increase (10 workers) can be attributed to substitution of labor for capital (the initial output of 20 exercise machines could have been produced with 10 workers and no capital). The remaining one-third of the change (5 workers) is scale effect (as a result of the drop in wages, the producer decided to increase output from 20 to 40, so more workers had to be hired).