## **Question 1**

- (a) C + 3P = 360. The MRS must be equal to the slope of the budget line, i.e.,  $-\sqrt{P}/\sqrt{C} = -1/3$ . Therefore  $3\sqrt{P} = \sqrt{C}$ , i.e., 9P = C. Thus, C = 270 and P = 30.
- (b) C + 5P = 600. The MRS must be equal to the slope of the budget line, i.e.,  $-\sqrt{P}/\sqrt{C} = -1/5$ . Therefore  $5\sqrt{P} = \sqrt{C}$ , i.e., 25P = C. Thus, P = 20. Her consumption therefore **decreases by 10 units**.

## **Question 2**

- (a) The budget line equation is 6R + c = 360. Since 10R = c, it follows that R = 22.5. Therefore she works 37.5 hours.
- (b) The budget line equation is 15R + c = 900. Since 10R = c, it follows that R = 36. Therefore she works 24 hours.
- (c)

## consumption



(d) Mary will therefore work 30 hours.

- Question 3 (a) The equation of the budget line is  $1.2c_1 + c_2 = 20,520$  At the optimal choice  $-c_2/(0.9c_1) = -1.2$ . Thus,  $c_2 = 1.08c_1$ . Inserting this in the budget line equation yields  $c_1 = 9,000$  and  $c_2 = 9,720$ .
  - (b) He will borrow 5,000 Dollars.
  - (c) The answer will change. He will borrow 1,500 Dollars.
- Question 4 (a) The expected utility without the lock is  $0.2\sqrt{500+0.8}\sqrt{1,000} = 29.77036$  The expected utility with the lock is  $0.02\sqrt{460+0.98}\sqrt{960} = 30.79314$  Therefore he will purchase the lock.
  - (b) Let *p* be the probability. Then the expected utility with the lock is  $p\sqrt{460} + (1-p)\sqrt{960} = 29.77036 = 0.2\sqrt{500} + 0.8\sqrt{1,000}$  Therefore p = 0.12725, which is about 1/7.85.
  - (c) Without insurance, expected utility is again  $0.2\sqrt{500} + 0.8\sqrt{1,000} = 29.77036$  With the insurance, it is  $\sqrt{940} = 30.6594$ . Therefore you should purchase the insurance
  - (d) Without the lock expected utility is  $0.2\sqrt{970} + 0.8\sqrt{990} = 31.4004$ With the lock expected utility is  $0.02\sqrt{965} + 0.98\sqrt{985} = 31.3783$ . Therefore you should not get the lock.
- Question 5 If he buys y shares then  $c_u = 5,000 + 3y$  and  $c_d = 5,000 2y$ . Therefore  $2c_u + 3c_d = 25,000$ . Thus,  $0.4c_u + 0.6c_d = 5,000$

The value of the option is 0.4(3) + 0.6(0), i.e., 1.20 Dollars.

**Question 6** The income offer curve is given by  $x_2/x_1 = 4$ , i.e.,  $4x_1 = x_2$ . The utility of (10, 10) is u(10, 10) = 100. Thus,  $x_1x_2 = 100$ . Solving the two equations for  $x_1$  and  $x_2$  yields  $x_1 = 5$ ,  $x_2 = 20$ . The cost of this consumption

is 40. The person needs m = 40.