(1) [**8 points**] A candy company sells candies for \$8 per box. Each box contains 50 candies and is made up of two varieties of candies. Variety A costs \$0.10 per candy to produce, while variety B costs \$0.20 per candy to produce. How many of each variety should a box of candies contain so that the production cost per box equals the sale price?

Let x = number of candies of variety A
y = number of variety B

$$x+y=50 \quad ①$$

$$(0.10)x+(0.20)y=8 \quad ②$$

Using ①: $y=50-x$

sub. into ②: $0.1x+0.2(50-x)=8$

$$0.1x+10-0.2x=8$$

$$-0.1x=-2$$

$$x=20$$

$$\therefore \quad y=50-x=50-20=30$$

$\therefore$ 20 of variety A and 30 of variety B should be included in each box.

(2) [**7 points**] The supply equation for a good is $S = 2p + 5$. At price $p = \$1$ the demand is $D = 19$. Assuming a linear demand equation and a market price of $p = \$3$, determine the demand equation.

At $p = 3$, $S = 2(3) + 5 = 11$.

$\therefore$ $(3, 11)$ is a point on both the supply line and the demand line (since $p = 3$ is market price.)

$\therefore$ demand line is the line through $(3, 11)$ and $(1, 19)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{19 - 11}{1 - 3} = \frac{8}{-2} = -4$$

$$\therefore \quad D - 11 = -4(p - 3)$$

or $\quad D = -4p + 12 + 11$

$$\boxed{D = -4p + 23}$$