(1) [4] Determine the market price if $S = 20p + 500$ and $D = 1000 - 30p$.

Solve $S = D$

$20p + 500 = 1000 - 30p$

$50p = 500$

$p = \$10$

(2) [4] Solve the following system of equations or say that it is inconsistent:

$$\left.\begin{array}{ll} ① & 3x - 6y = 2 \\ ② & 5x + 4y = 1 \end{array}\right\}$$

new ① = 5(old ①):

new ② = -3(old ②):

$$\left.\begin{array}{ll} ① & 15x - 30y = 10 \\ ② & -15x - 12y = -3 \end{array}\right\}$$

new ② = old ① + old ②:

$$\begin{array}{ll} ① & 15x - 30y = 10 \\ ② & 0x - 42y = 7 \end{array}$$

$\therefore y = -\frac{7}{42} = \frac{-1}{6}$

$15x - 30y = 10$

$15x - 30\left(\frac{-1}{6}\right) = 10$

$15x = 5$

$x = \frac{5}{15} = \frac{1}{3}$

$\therefore (x, y) = \left(\frac{1}{3}, \frac{-1}{6}\right)$

(3) [7] For a certain commodity the supply equation is

$$S = 2p + 5$$

At a price of \$1 there is a demand for 19 units of the commodity. Find the demand equation if the demand equation is linear and the market price is \$3 .

When $p = 1$, $D = 19$, so $(1, 19)$ is a point on demand line.

When $p = 3$, $S = 2(3) + 5 = 11$, so $(3, 11)$ is a point on supply line. Since $p = 3$ is the market price, $(3, 11)$ is also on the demand line.

∴ Demand equation is line through $(1, 19)$ and $(3, 11)$:

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

∴ $D - 19 = -4(p - 1)$

$D - 19 = -4p + 4$

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