(1) [7] A person has \$140,000 to invest and two investments are available. One pays 7% interest per year while the second only pays 4% per year. How should the \$140,000 be split between the two investments in order to earn a total of \$7100 in interest income over a one year period?

Let x = amount invested at 7%

y = amount invested at 4%.

① $x + y = 140{,}000$

② $0.07x + 0.04y = 7100$

① $\Rightarrow$ $y = 140\,000 - x$

② $\Rightarrow$ $0.07x + 0.04(140\,000 - x) = 7100$

$0.07x + 5600 - 0.04x = 7100$

$0.03x = 7100 - 5600$

$x = \frac{1500}{0.03}$

$x = 50\,000$

$\therefore y = 140\,000 - 50\,000$

$= 90\,000$

$\therefore$ \$50,000 should be invested at 7%,
\$90,000 should be invested at 4%

(2) [8] For a certain commodity the supply equation is $S = 2p+5$. At a price of \$1 there is a demand for 19 units. If the market price is \$3 determine the demand equation assuming it is linear.

Graph both the supply and demand equations.

at $p = 1$, $D = 19$,

so $(1, 19)$ is a point on D line.

at market price $p = 3$,

$D = S = 2(3)+5 = 11$,

so $(3, 11)$ is a point on D line.

$$m_D = \frac{D_2 - D_1}{p_2 - p_1} = \frac{11 - 19}{3 - 1} = \frac{-8}{2} = -4$$

$\therefore$ equation is $D - D_1 = m_D(p - p_1)$

$D - 19 = -4(p - 1)$

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