1. **(4 points)** *Dried pears sell for \$5.50 per pound and dried apricots sell for \$6.25 per pound. If x is the number of pounds of dried pears in a 15-pound mixture of dried pears and apricots, give an expression for the value of the mixture in dollars.*

   There are x pounds of pears in the mixture, which have a value of $5.50x$ dollars; the remainder of the mixture is apricots. Since x pounds of a 15-pound mixture have been accounted for, the aforementioned remainder is $(15 - x)$. Thus, there are $(15 - x)$ pounds of apricots in the mixture, which have a value of $6.25(15 - x)$ dollars. The value of the entire mixture is simply the sum of the values of its constituent parts, which is $5.50x + 6.25(15 - x)$. This may, but need not be, simplified to $93.75 - 0.75x$.

2. **(6 points)** *Yorick drives west from his home at an even pace of 60 miles per hour. His housemate Zenobia starts driving west from the same place half an hour later. If she drives at 80 miles per hour, how long will it take her to catch him?*

   Let us denote the total amount of time Zenobia drives to catch up with Yorick as "t"; thus, after Zenobia has driven for a time t and Yorick has drive for a time $t + \frac{1}{2}$, they are in the same place. Building a table to represent each of their travel speeds, times, and distances, we get:

	Speed	Time	Distance
Yorick	60	$t + \frac{1}{2}$	$60(t + \frac{1}{2})$
Zenobia	80	t	$80t$

   Since we established that at time t they had both driven the same distance from their home, the equation describing the relationships of these two distances is simply:

   $$\begin{aligned} 60(t + \tfrac{1}{2}) &= 80t \\ 60t + 30 &= 80t \\ 30 &= 20t \\ \frac{3}{2} &= t \end{aligned}$$

   So $t = \frac{3}{2}$ hours; alternatively, one might think of this as 1.5 hours, or as 1 hour 30 minutes, or as 90 minutes.

3. **(2 points)** *Calculate the sum of complex numbers* $(3 - 5i) + (-1 + 7i)$.

   Since the sum of complex numbers can be performed as if "i" were any named quantity, we collect the real terms (those without multiplication by i), and the imaginary terms (those multiplied by i) to get $(3 - 1) + (-5 + 7)i = 2 + 2i$.

4. **(3 points)** *Calculate the product of complex numbers* $(3 - 5i)(-1 + 7i)$.

   We multiply the numbers as if i were any named quantity, using standard distributive-law techniques to get a sum of four individual products; we then use the critically important fact that $i^2 = -1$ to simplify:

   $$\begin{aligned} (3 - 5i)(-1 + 7i) &= -3 + 21i + 5i - 35i^2 \\ &= 3 + 21i + 5i - 35(-1) \\ &= (3 + 35) + (21 + 5)i = 38 + 26i \end{aligned}$$