Homework 2 solutions.

1. Area of \( \triangle ABCP \) = \( 32 \times 10 = 320 \)
   Area of \( \triangle AMQ \) = \( \frac{1}{2} \times 6 \times 11 = 33 \)
   \( BMN = \frac{1}{2} \times 21 \times 4 = 42 \)
   \( CNP = \frac{1}{2} \times 6 \times 11 = 33 \)
   \( DPQ = \frac{1}{2} \times 4 \times 21 = 42 \)

Area of \( \square ABCD \) minus the four triangles is the area of \( \square MNPQ \)

\[
\text{area of } \square MNQP = 320 - 33 - 33 - 42 - 42 = \\
320 - 150 = 170 \text{ cm}^2
\]

2. Clock says 5:16 when she leaves.
   So 6 hrs + 11 min later, when she gets home, it is 11:27.
   The clock says 3:37, so it has been 3 hrs + 37 min since the power came back on.

   \( 11:27 - 3\text{ hrs} + 37 \text{ min} \rightarrow 7:50 \text{ a.m.} \)
3. \[\frac{1-3+5-7+9-11+13}{2} + \frac{1+0+9-11+13}{2}\]

After the one, each pair of terms adds 2 to the sum.

So how many terms do we add if we go up to 1413?

For each \(k\)

At 13, we've added 2 3 times

\[\frac{13-1}{4} = 3\]

However, i.e. if we divide \(\frac{1413-1}{4}\), we get how many times to add 2: 353 times

So \(1 + 2 \cdot 353 = 707\).

4. If we sell \(x\) packages of 5 and \(y\) packages of 2,

\[5x + 2y = 90\]

So \(5x = 90 - 2y\), so \(5x\) must be even,

\(\Rightarrow\) \(x\) must be even.

\[\begin{array}{c|cccccccc}
 x & 0 & 2 & 4 & 6 & 8 & 10 & 12 \\
 \hline
 y & 45 & 40 & 35 & 30 & 25 & 20 & 15 \\
\end{array}\]

\[\begin{array}{c|cccc}
 x & 14 & 16 & 18 \\
 \hline
 y & 10 & 5 & 0 \\
\end{array}\]

So 9 ways
5. $19x + 17y = 108$, need $x$ and $y$ to be integers.

Clearly, $x$ and $y$ must be fairly small.

If $x = 1$, \[
\frac{17y - 108}{19} = 1
\]

$17y - 108 = 19$
$17y = 127$ but $\frac{127}{17}$ is not an integer.

Do similar check. Only have to go to $x = 3$

$19 \cdot 3 + 17 \cdot 3 = 108$

Another method:

$10(x + y) + 9x + 7y = 108$

(Some people "can just see" the answer when it looks like this.)