P108 23

The harmonic mean of positive real numbers x and y is always no larger than their geometric mean ($\frac{2\mathrm{xy}}{x+y} \leq \sqrt{\mathrm{xy}}$).

To prove it, we know that $\sqrt{xy} \leq \frac{x+y}{2}(\mathrm{x}, \mathrm{y} > 0)$, so we can know that $\frac{2\sqrt{xy}}{x+y} \leq 1(\mathrm{x}, \mathrm{y} > 0)$ and then $\frac{2\mathrm{xy}}{x+y} \leq \sqrt{\mathrm{xy}}(\mathrm{x}, \mathrm{y} > 0)$ holds.

P109 43

From there is an even number of squares, we can know that either there is an even number of squares in each row or there is an even number of squares in each column.

In the former case, we can tile each row by placing the dominoes horizontally and then tile the whole board. In the latter case, we can tile each column by placing the dominoes vertically and then tile the whole board.

P153 11

The one in part (a).

P154 35

No.

Assume that A={a}, B={b, c}, C={d} and let $g(a)=b$, $f(b)=f(c)=d$. Then f from B to C and $f \circ g$ from A to C are both onto, but g from A to B is not onto.

P155 79

a) We can know that S has m distinct elements. Let $S=\{s_1, s_2, \ldots s_m\}$, and we can assign s_i to $i(1 \leqslant i \leqslant m)$, which is a qualified one-to-one correspondence.

b) From (a), we can let $S=\{s_1, s_2, \ldots s_m\}$ and $T=\{t_1, t_2, \ldots t_m\}$. We can assign s_i to $t_i(1 \leqslant i \leqslant m)$, which is a qualified one-to-one correspondence.

P169 25

a) $a_n = \begin{cases} 1, & k^2 - k + 1 \le n \le k^2 (\mathrm{k} \in Z_+) \\ 0, & k^2 < n \le k^2 + k (\mathrm{k} \in Z_+) \end{cases}$ 1,1,1

b) $a_n = \begin{cases} 2k - 1, & n = 3k - 2 (\mathrm{k} \in Z_+) \\ 2k, & n = 3k - 1, 3k (\mathrm{k} \in Z_+) \end{cases}$ 9,10,10

c) $a_n = \begin{cases} 2^{\frac{n-1}{2}}, & \mathrm{n} = 2\mathrm{k} - 1 (\mathrm{k} \in Z_+) \\ 0, & \mathrm{n} = 2\mathrm{k} (\mathrm{k} \in Z_+) \end{cases}$ 32,0,64

d) $a_n=3\cdot 2^{n-1}$ 384,768,1536

e) $a_n=22-7n$ -34,-41,-48

f) $a_n = 2 + \frac{n(n+1)}{2}$ 57,68,80

g) $a_n=2n^3$ 1024,1458,2000

h) $a_n=n!+1$ 362881,3628801,39916801

P169 33

a) (1+1)+(1+2)+(1+3)+(2+1)+(2+2)+(2+3)=21

b) (0+0)+(0+3)+(0+6)+(0+9)+(2+0)+(2+3)+(2+6)+(2+9)+(4+0)+(4+3)+(4+6)+(4+9)=78

c) 1+2+3+1+2+3+1+2+3=18

d) 0+0+0+1+2+3+2+4+6=18

P169 41

Let $\mathrm{k} = \mathrm{floor}\left(\sqrt{m}\right) - 1$, and the formula will be $\frac{k(k+1)(2k+1)}{3} + \frac{k(k+1)}{2} + (k+1)[m+1-(k+1)^2]$

P177 27

Assume that there are n sets. Let $\mathrm{A} = \bigcup_{i=1}^{n} A_i$ and each countable set $A_i=\{a_{i1}, a_{i2}, \ldots\}$. So the elements in A can be listed as a_{ij}, which satisfies $i+j=k(k>1, k\in \mathrm{Z})$.

So the union of a countable number of countable sets is countable.