92	89	90	88	95	100	98	93	95	84
82	86	90	88	86	91	90	89	85	83
80	74	80	67	81	82	76	77	74	65
72	68	74	73	70	69	72	70	68	67
69	67	68	68	64	66	63	63	70	68

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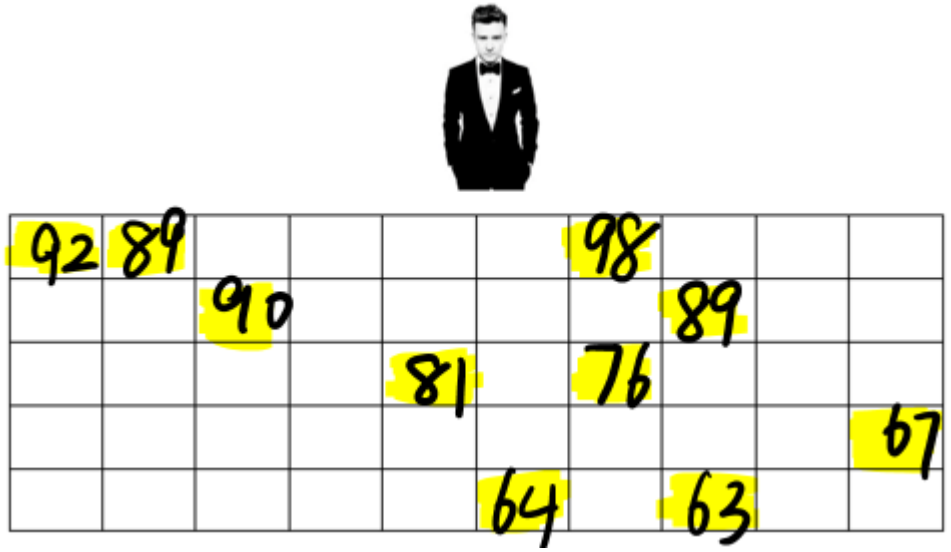
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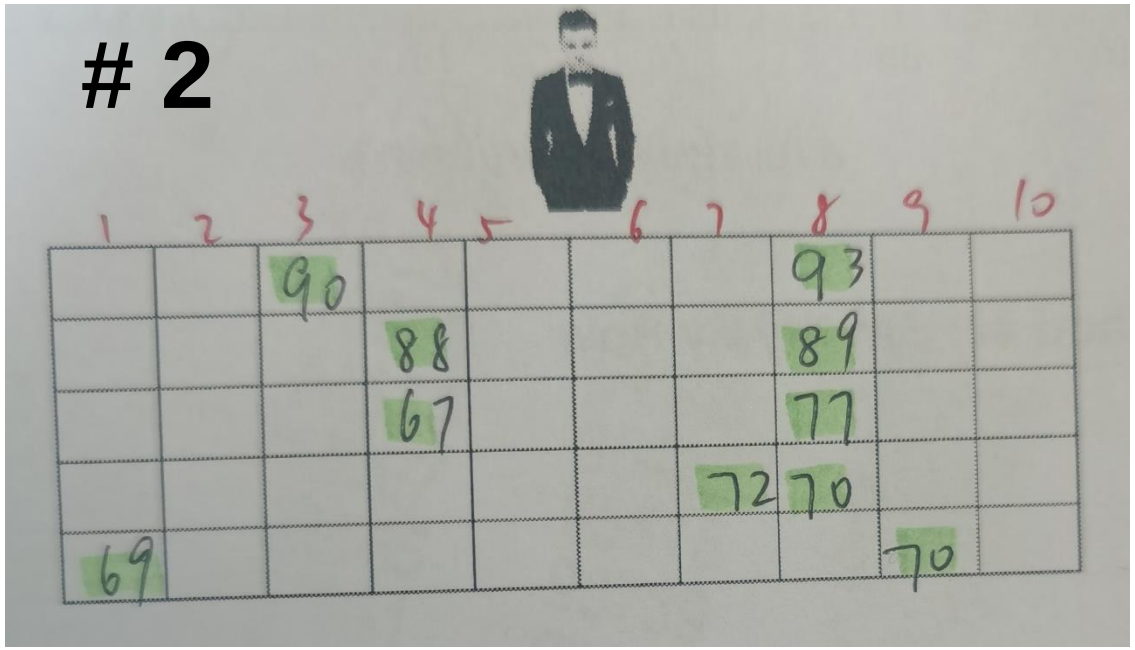
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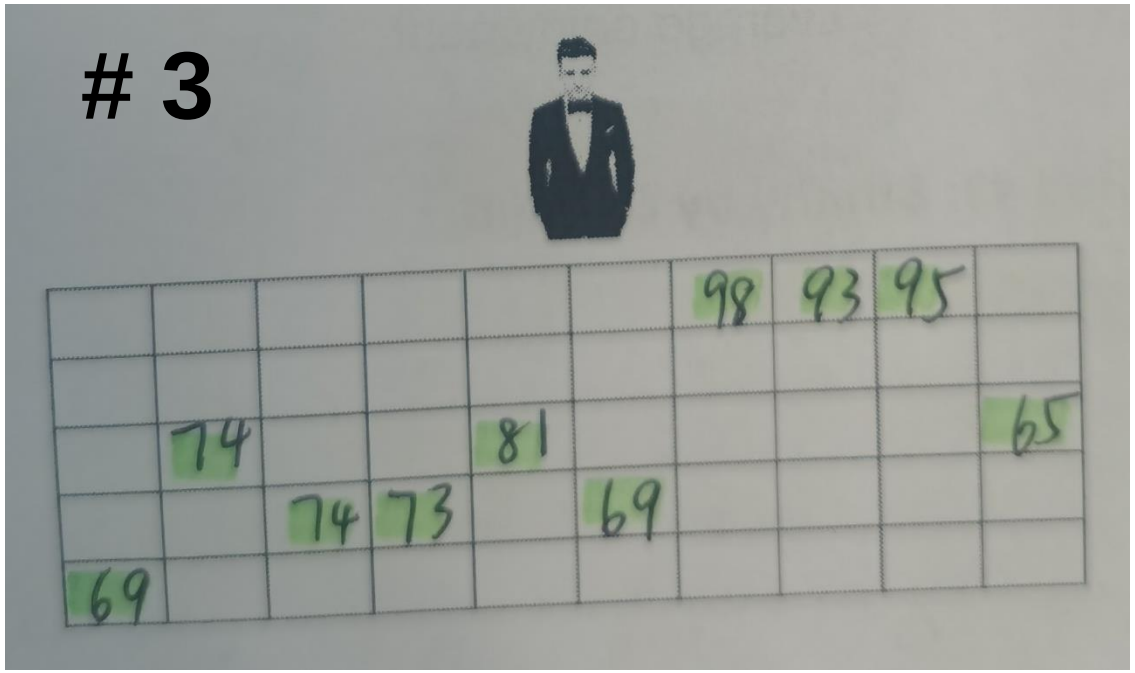
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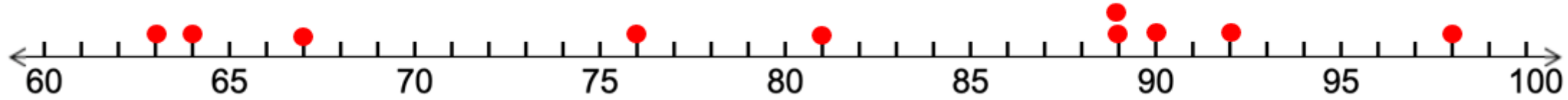
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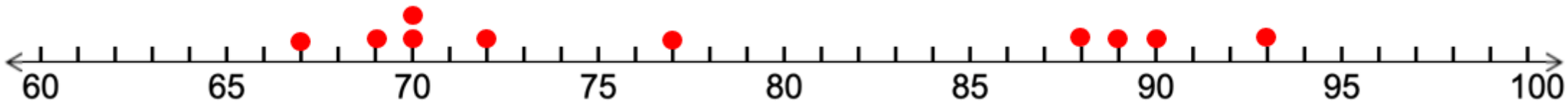
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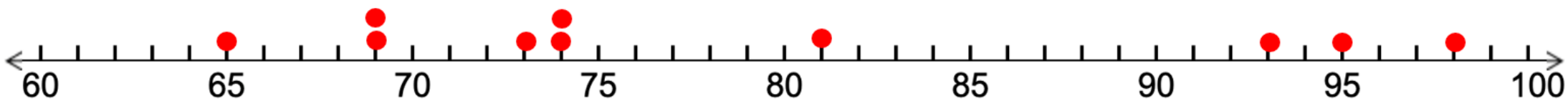
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Method #	Sample mean	Sample standard deviation
1	81.1	12.42
2	78.5	10.29
3	79.1	12.01

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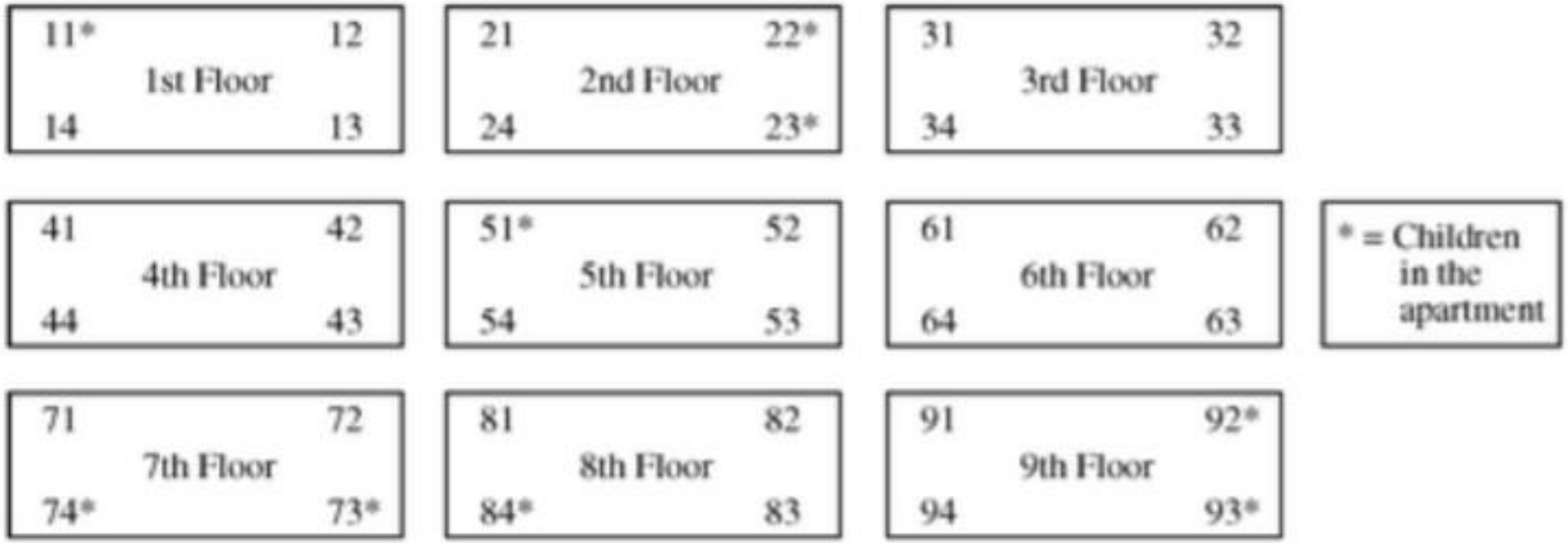
Why ?

We should choose strata based on characteristics that may affect responses.

An apartment building has nine floors and each floor has four apartments. The building owner wants to install new carpeting in eight apartments to see how well it wears before she decides whether to replace the carpet in the entire building.

The figure below shows the floors of apartments in the building with their apartment numbers. Only the nine apartments indicated with an asterisk (*) have children in the apartment.



a. For convenience, the apartment building owner wants to use a cluster sampling method, in which the floors are clusters, to select the eight apartments. Describe a process for randomly selecting eight different apartments using this method.

The following two-step process can be used to select the eight apartments.

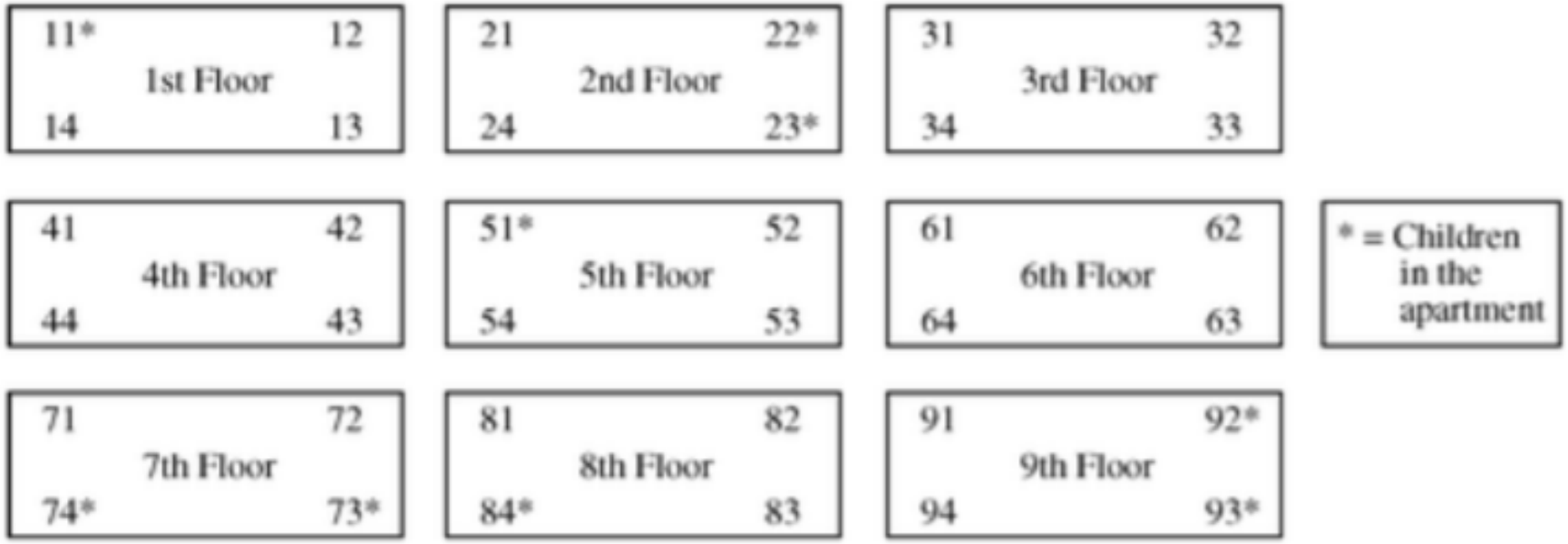
Step 1: Generate a random integer between 1 and 9, inclusive, using a calculator, a computer program, or a table of random digits. Select all four apartments on the floor corresponding to the selected integer.

Step 2: Generate another random integer between 1 and 9, inclusive. If the generated integer is the same as the integer generated in step 1, continue generating random integers between 1 and 9 until a different integer appears. Again select all four apartments on the floor corresponding to the second selected integer.

The cluster sample consists of the eight apartments on the two randomly selected floors.

An apartment building has nine floors and each floor has four apartments. The building owner wants to install new carpeting in eight apartments to see how well it wears before she decides whether to replace the carpet in the entire building.

The figure below shows the floors of apartments in the building with their apartment numbers. Only the nine apartments indicated with an asterisk (*) have children in the apartment.



b. An alternative sampling method would be to select a stratified random sample of eight apartments, where the strata are apartments with children and apartments with no children. A stratified random sample of size eight might include two randomly selected apartments with children and six randomly selected apartments with no children. In the context of this situation, give one statistical advantage of selecting such a stratified sample as opposed to a cluster sample of eight apartments using the floors as clusters.

Because the amount of wear on the carpets in apartments with children could be different from the wear on the carpets in apartments without children, it would be advantageous to have apartments with children represented in the sample. The cluster sampling procedure in part (a) could produce a sample with no children in the selected apartments; for example, a cluster sample of the apartments on the third and sixth floors would consist entirely of apartments with no children. Stratified random sampling, where the two strata are apartments with children and apartments without children, guarantees a sample that includes apartments with and without children, which, in turn, would yield sample data that are representative of both types of apartments.