

归纳推理 (inductive reasoning) : 寻找规律或趋势, 然后推广 (looking for a pattern or a trend and then generalizing)

演绎推理 (deductive reasoning) : 从一些数据或事实出发演绎得到其它正确的事实 (taking some set of data or some set of facts and using that to come up with other, or deducing some other, facts that you know are true)

归纳推理在推广时, 并不确定趋势是否会继续, 只是假设它会继续, 而演绎推理则知道肯定正确。例如, 某市根据过去人口的增长统计, 预测未来的人口规模就是归纳推理

Hiram solved the equation $5 + \sqrt{x+14} = x + 7$ using the following steps:

- Subtract 5 from both sides: $\sqrt{x+14} = x + 2$
- Square both sides: $x + 14 = (x+2)^2$
- Use the pattern for square binomials to expand the right side: $x + 14 = x^2 + 4x + 4$
- Subtract $x + 14$ from both sides: $0 = x^2 + 3x - 10$
- Factor the right side: $0 = (x + 5)(x - 2)$
- Use the Zero Product Property to solve the equation: $x = -5$ or $x = 2$.
- Check both answers:
 $5 + \sqrt{-5+14} = -5 + 7$
 $5 + \sqrt{9} = 2$
 $5 + 3 = 2$ (False)
 $5 + \sqrt{2+14} = 2 + 7$
 $5 + \sqrt{16} = 9$
 $5 + 4 = 9$ ✓

- The answer is $x = 2$.

上面的案例是演绎推理吗? 是的, 它从事实出发, 使用逻辑步骤、运算或推理得到其它事实。这里没有估计、没有推广、没有假设未来的趋势。

再比如, 使用分配率等性质, 演绎:

Use deductive reasoning and the distributive property to justify $(x + y)^2 = x^2 + 2xy + y^2$. Provide the reasoning for each step.

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$$a(b + c) = ab + ac$$

$$\boxed{(x + y)^2} = \boxed{(x + y)}(x + y)$$

$$\div$$
$$= x(x + y) + y(x + y)$$

$$= \underline{xx} + \underline{xy} + \underline{yx} + \underline{yy}$$

$$= x^2 + 2xy + y^2$$