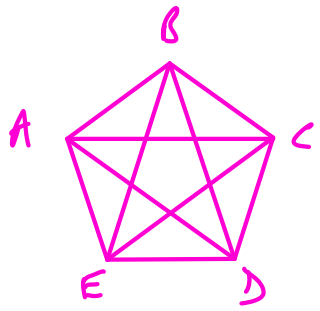
# Number of Ways

Ex 1 5 people are in a room. Everyone shakes the hand of everyone else. How many hand shakes take place?




$$\frac{5 \times 4}{2} = 10$$

n people would carry out

$$\frac{n \times (n-1)}{2} = \frac{n^2 - n}{2}$$

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Ex 2 There are 4 boys in a group and 5 girls. How many ways can you pick a leadership team consisting of 1 boy and 1 girl?

Boys

A B C D

Girls

E F G H I

| | | | |
|---|---|---|---|
| A E | B E | C E | D E |
| A F | B F | C F | D F |
| A G | B G | C G | D G |
| A H | B H | C H | D H |
| A I | B I | C I | D I |

$= 4 \times 5 = 20$

Ex3 There are 6 girls in a group. Two are to be selected for a tennis doubles match. How man different teams could be selected?

$$= \frac{6 \times 5}{2} = 15$$

A B C D E F

| | | | | | |
|---|---|---|---|---|---|
| AB | BA | CA | DA | EA | FA |
| AC | BC | CB | DB | EB | FB |
| AD | BD | CD | DC | EC | FC |
| AE | BE | CE | DE | ED | FD |
| AF | BF | CF | DF | EF | FE |

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Choosing a Three Course Meal

| Starters | Mains | Desserts |
|---|---|---|
| Soup | Fish | Trifle |
| Pasta | Chicken | Rice |
| | Beef | Custard Tart |
| | Lamb | |

$$2 \times 4 \times 3 = 24$$

List

SFT, SFR, SFC, SCT, SCR, SCC

SBT, SBR, SBC, SLT, SLR, SLC

PFT, PFR, PFC, PCT, PCR, PCC
PBT, PBR, PBC, PLT, PLR, PLC

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Iteration

$$x_{n+1} = \frac{2}{3+x_n} \qquad x_0 = 2$$

Find $x_1, x_2, x_3$

$$x_1 = \frac{2}{3+x_0}$$

$$= \frac{2}{3+2} = \frac{2}{5} = 0.4$$

$$x_2 = \frac{2}{(3+0.4)} = \frac{10}{17} = 0.588$$

$$x_3 = \frac{2}{(3+0.588)} = 0.557$$

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Real Exam Question

Using $x_{n+1} = -2 - \frac{4}{x_n^2}$ with $x_0 = -2.5$

Find $x_1, x_2, x_3$

$$x_1 = -2 - \frac{4}{x_0^2} = -2 - \frac{4}{(-2.5)^2}$$

$$= -\frac{66}{25} = -2.64$$

$$x_2 = -2 - \frac{4}{(-2.64)^2} = -2.5739$$

$$x_3 = -2 - \frac{4}{(-2.5739)^2} = -2.6038$$

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Ex Let $x_{n+1} = \sqrt{3x_n + 5}$ $\quad x_0 = 2$

Find $x_1, x_2, x_3$

$$x_1 = \sqrt{3(2)+5} = 3.317$$

$$x_2 = \sqrt{3(3.317)+5} = 3.867$$

$$x_3 = \sqrt{3(3.867)+5} = 4.074$$

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Exam Quest Find $x_1, x_2, x_3$

$x_0 = 0$ $\quad x_{n+1} = \dfrac{4}{x_n^2 + 5}$

$$x_1 = \frac{4}{0^2+5} = \frac{4}{5} = 0.8$$

$$x_2 = \frac{4}{(0.8^2+5)} = 0.709$$

$$x_3 = \frac{4}{(0.709^2+5)} = 0.727$$

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