Craps Flowchart

```
Name:
Date:
Puspose:
```

↓

```
System
Libraries
iostream
iomanip
cstdlib
ctime
fstream
```

↓

```
User
Libraries
```

↓

```
Global
Constantts
CNVPERC=100.0f
```

↓

```
Function
Prototypes
```

↓

(A)

(A)

↓

(main)

↓

```
Set Random Seed
srand(static_cast<unsignedint>(time(0)))
```

↓

```
Declare Variables
ifstream in;
ofstream out;
int nGames,wins,losses,nThrows,mxThrGm,fGames;
int w12,w11,w10,w9,w8,w7,w6,w5,w4,w3,w2;
int l12,l11,l10,l9,l8,l7,l6,l5,l4,l3,l2;
```

↓

```
Initialize Variables
nGames=3600000,wins=0,losses=0,nThrows=0,mxThrGm=0;
w12=w11=w10=w9=w8=w7=w6=w5=w4=w3=w2=0;
l12=l11=l10=l9=l8=l7=l6=l5=l4=l3=l2=0;
```

↓

(B)

```
Open Files
in.open("fGames.dat");
out.open("stats.dat");
```

↓

< in > — True → [Input fGames]

↓ False

< fGames<nGames >

False ↓   True ↓

```
nGames =
nGames
```

```
nGames =
fGames
```

↓

(page 2)

```
page 2
  │
  ▼
┌──────────────┐        ┌──────────────┐
│ Declare and  │        │  For-Loop    │
│ Initialize   │        │  page 2      │
│ int game=1   │        └──────────────┘
└──────────────┘
  │
  ▼
 ◇ game<=nGames ─── False ──▶ ( C )
  │
  │ True
  ▼
┌────────────────────┐
│ Declare and        │
│ Initialize         │
│   char die1        │
│ = rand()%6+1;//[1,6]│
│   char die2        │
│ = rand()%6+1;//[1,6]│
│ char sum1=die1+die2;│
│   unsigned short   │
│   gmThrws=1;       │
│   bool win=false;  │
└────────────────────┘
  │
  ▼
┌──────────────┐
│  nThrows++   │
└──────────────┘
```

losses++ ──────────────▶ page 4

True

◇ sum1==2 ||
  sum1==3 ||
  sum1==12   ── False ──▶ ◇ sum1==7 ||
                              sum1==11   ── True ──▶ ┌──────────┐
                                                      │ wins++; │
                                                      │ win=true;│
                                                      └──────────┘
                                                           │
                                                           ▼
                                                        page 4

       False
         │
         ▼
      page 3

(C) ──▶ ⟋ Output Stdout   ⟍ ──▶ ⟋ Output Stat File   ⟍
          │ All Statistics   │   │ All Statistics   │
          │ wins, losses, nGames, │   │ wins, losses, nGames, │
          │ wins/losses 2 - 12   │   │ wins/losses 2 - 12   │
           ⟍_____⟋   ⟍_____⟋
                                                    │
                                                    ▼
                                           ┌──────────────┐
          (return/exit) ◀────────────── │ Close files │
                                           │   in/out   │
                                           └──────────────┘

```mermaid
flowchart

page3((page 3)) --> bool[bool\nstpGame=false]
bool --> throws[die1=rand()%6+1;//[1,6]\ndie2=rand()%6+1;//[1,6]\nchar sum2=die1+die2;\nnThrows++;gmThrws++;]
throws --> sum1(("sum1==sum2"))
sum1 -->|True| wins[wins++;\nstpGame=true;\nwin=true;]
sum1 --> sum2cond(("sum2==7"))
sum2cond -->|True| losses[losses++;\nstpGame=true;]
wins --> stpcond(("!stpGame"))
losses --> stpcond
stpcond -->|False| page4((page 4))
```

page 3

bool
stpGame=false

die1=rand()%6+1;//[1,6]
die2=rand()%6+1;//[1,6]
char sum2=die1+die2;
nThrows++;gmThrws++;

sum1==sum2

True

wins++;
stpGame=true;
win=true;

losses++;
stpGame=true;

True

sum2==7

!stpGame

False → page 4

```
                                    ┌──────────────┐
      ( page 4 )                    │  mxThrGm =   │
                                    │   gmThrws    │         ◇ sum1 == 10 ◇──False──◇ sum1 == 9 ◇──False──◇ sum1 == 8 ◇──False──( page 5 )
          │                         └──────────────┘              │                       │                      │
          ▼                              ▲                        │ True                  │ True                 │ True
     ◇ gmThrws ◇───True──────────────────┘                        ▼                       ▼                      ▼
     ◇ > mxThrGm ◇                                             ◇ win ◇                  ◇ win ◇                ◇ win ◇
          │                                                  True    False            True    False        True    False
          │ False                                             │        │               │        │            │        │
          ▼                                                   ▼        ▼               ▼        ▼            ▼        ▼
     ◇ sum1 == 12 ◇──False──◇ sum1 == 11 ◇                 w10++    l10++            w9++     l9++         w8++     l8++
          │                       │
          │ True                  │ True
          ▼                       ▼
       ◇ win ◇                  ◇ win ◇
     True    False           True    False
      │        │              │        │
      ▼        ▼              ▼        ▼
    w12++    l12++          w11++    l11++
```

For-Loop page 2

```
                                    ┌──────────┐      False      ┌──────────┐     False      ┌──────────┐
  ( page 5 )                        │ sum1 == 5 │ ─────────────> │ sum1 == 4 │ ────────────> │ sum1 == 3 │ ───────────┐
                                    └──────────┘                 └──────────┘                └──────────┘            │
       │                                  │ True                       │ True                      │ True            │
       │                                  ▼                            ▼                           ▼                 │
       │                              ┌───────┐                    ┌───────┐                   ┌───────┐             │
       │                              │  win  │                    │  win  │                   │  win  │             │
       │                              └───────┘                    └───────┘                   └───────┘             │
       │                          True │       │ False        True │      │ False         True │      │ False        │
       ▼                               ▼       ▼                   ▼      ▼                     ▼      ▼              ▼
┌──────────┐  False  ┌──────────┐   ┌─────┐ ┌─────┐           ┌─────┐  ┌─────┐            ┌─────┐  ┌─────┐      ┌───────┐
│ sum1 == 7 │ ─────> │ sum1 == 6 │  │ w5++│ │ l5++│           │ w4++│  │ l4++│            │ w3++│  │ l3++│      │  win  │
└──────────┘         └──────────┘   └─────┘ └─────┘           └─────┘  └─────┘            └─────┘  └─────┘      └───────┘
      │ True              │ True                                                                               True │
      ▼                   ▼                                                                                         ▼
  ┌───────┐           ┌───────┐                                                                               ┌───────┐
  │  win  │           │  win  │                                                                               │  w2++ │
  └───────┘           └───────┘                                                                               └───────┘
True │   │ False  True │   │ False                                                                                 │
     ▼   ▼             ▼   ▼                                                                                       ▼
 ┌─────┐ ┌─────┐   ┌─────┐ ┌─────┐                      ┌─────────────┐                                        ┌─────┐
 │ w7++│ │ l7++│   │ w6++│ │ l6++│                      │  For-Loop   │                                        │ l2++│
 └─────┘ └─────┘   └─────┘ └─────┘                      │   page 2    │                                        └─────┘
                                                        └─────────────┘
```