

Define the function that convert numbers to the format in file names

```
In[1]:= number2Printed[number_] := Module[{returnedString = "e", foo, bar, idx, oom},  
    [模組  
  
    If[number == 1, Return["1.0e+00"], If[number == 0, Return["0.0e+00"],  
    [如果 [返回 [如果 [返回  
  
    If[number < 1,  
    [如果  
  
        For[idx = 1, StringLength[returnedString] == 1, idx = idx + 1,  
        [For迴圈 [字串長度  
  
            foo = Floor[number / 10^(-idx)];  
            [弱取整  
  
            If[foo == 0, ,  
            [如果  
  
                bar = Round[(number - foo * 10^(-idx)) / 10^(-idx - 1)];  
                [捨入  
  
                If[StringLength[ToString[idx]] == 1,  
                [字串長度 [轉換成字串  
  
                    returnedString = StringJoin[ToString[foo],  
                    [字串結合 [轉換成字串  
  
                        ".", ToString[bar], returnedString, "-0", ToString[idx]],  
                        [轉換成字串 [轉換成字串  
  
                    returnedString = StringJoin[ToString[foo], ".", ToString[bar],  
                    [字串結合 [轉換成字串 [轉換成字串  
  
                        returnedString, "-", ToString[idx]]  
                        [轉換成字串  
  
                ]  
            ]  
        ];  
    Return[returnedString]  
    [返回  
  
    ,  
    oom = (StringLength[ToString[DecimalForm[Floor[number] * 1.]] - 2);  
    [字串長度 [轉換成字串 [十進位形式 [弱取整  
  
    foo = Floor[number / 10^oom];  
    [弱取整  
  
    bar = Round[(number - foo * 10^oom) / 10^(oom - 1)];  
    [捨入  
  
    If[StringLength[ToString[oom]] == 1,  
    [字串長度 [轉換成字串  
  
        returnedString = StringJoin[ToString[foo],  
        [字串結合 [轉換成字串  
  
            ".", ToString[bar], returnedString, "+0", ToString[oom]],  
            [轉換成字串 [轉換成字串
```

```

    returnedString = StringJoin[ToString[foo], ".", ToString[bar],
                                字串結合 轉換成字串 轉換成字串
                                returnedString, "+", ToString[oom]]
                                轉換成字串
  ];
  Return[returnedString]
  返回
];
]
]
]

```

Import parameters

```

In[2]:= combinedParameters = Interpreter[DelimitedSequence["Number", {"[", " ", " ", "]" }]]
                                解釋器 分隔序列 數
                                Import[StringJoin[NotebookDirectory[], "combined_parameters.txt"]];
                                導入 字串結合 筆記本目錄
sequenceLengths = Interpreter[DelimitedSequence["Number", {"[", " ", " ", "]" }]]
                                解釋器 分隔序列 數
                                Import[StringJoin[NotebookDirectory[], "sequence_lengths.txt"]];
                                導入 字串結合 筆記本目錄
populationSizes = Interpreter[DelimitedSequence["Number", {"[", " ", " ", "]" }]]
                                解釋器 分隔序列 數
                                Import[StringJoin[NotebookDirectory[], "population_sizes.txt"]];
                                字串結合 筆記本目錄

```

Import data

```

In[5]:= histograms = Table[Table[Table[Transpose[
                                表格 表格 表格 轉置
                                Interpreter[
                                解釋器
                                DelimitedSequence[DelimitedSequence["Number", {"[", " ", " ", "]" }, {"[", " ", " ", "]" }]]
                                分隔序列 分隔序列 數
                                Import[StringJoin[NotebookDirectory[], number2Printed[combinedParameters[[idx1]]],
                                導入 字串結合 筆記本目錄
                                "_", number2Printed[sequenceLengths[[idx2]]], "_",
                                number2Printed[populationSizes[[idx3]]], ".txt"]]]
                                ], {idx3, Length[populationSizes]}, {idx2, Length[sequenceLengths]},
                                長度 長度
                                {idx1, Length[combinedParameters]}];
                                長度

```

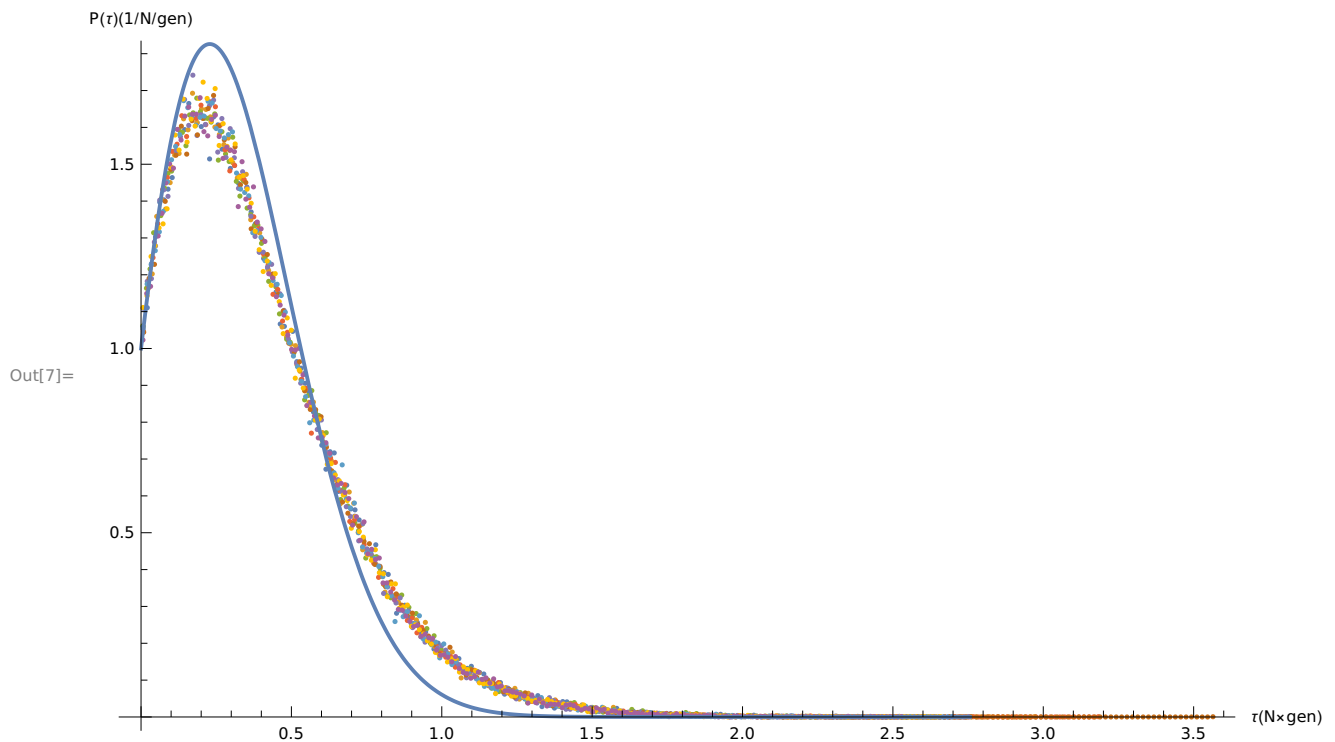
Plot the data and the prediction

```

In[6]:= prediction[tau_, combinedParameter_] :=
  (combinedParameter * tau + 1) * Exp[-combinedParameter * tau^2 / 2 - tau];
  [指數形式]

In[7]:= With[{idx0 = 6}, Show[ListPlot[
  [同一起] [顯示] [點集圖]
    Flatten[Table[Table[histograms[[idx0, idx1, idx2]], {idx2, Length[populationSizes]}],
    [壓平] [表格] [表格] [長度]
      {idx1, Length[sequenceLengths]}], 1], ImageSize → Full,
    [長度] [影像尺寸] [全範圍]
    PlotRange → All, AxesLabel → {"τ(N×gen)", "P(τ)(1/N/gen)"},
    [繪製範圍] [全部] [座標軸標籤] [數值化] [數值化]
    Plot[prediction[tau, combinedParameters[[idx0]]],
    [繪圖]
      {tau, 0, Transpose[Max[histograms[[idx0, 1, 1]]][[1]], PlotStyle → Thick}],
    [轉置] [最大值] [繪製樣式] [厚]

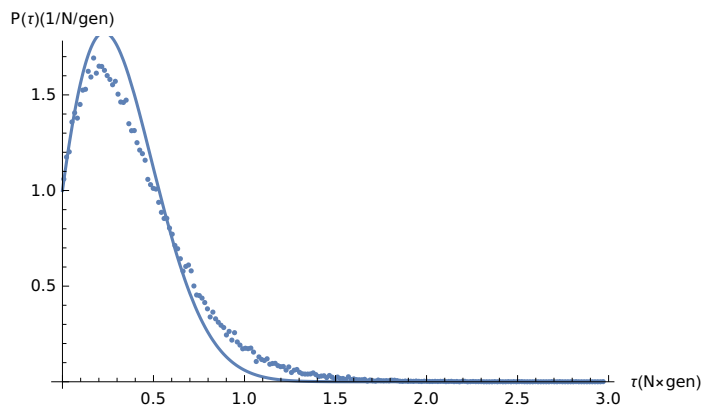
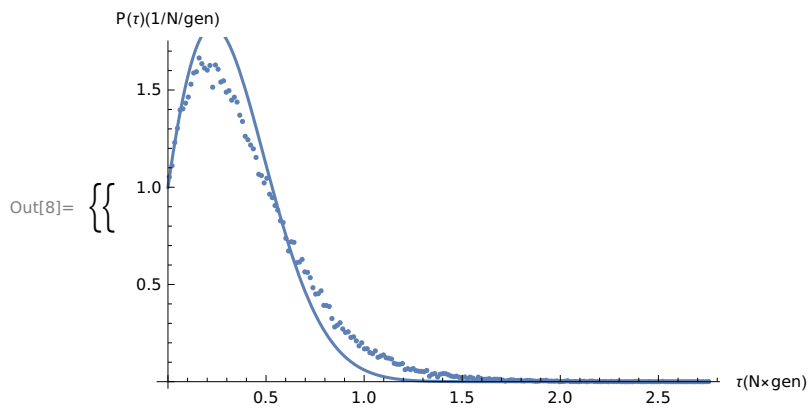
```

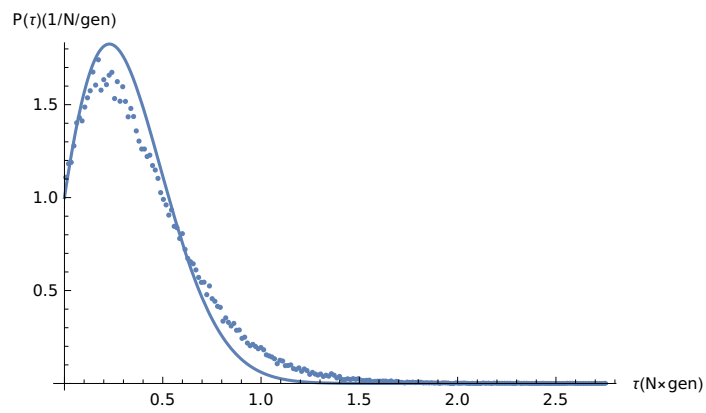
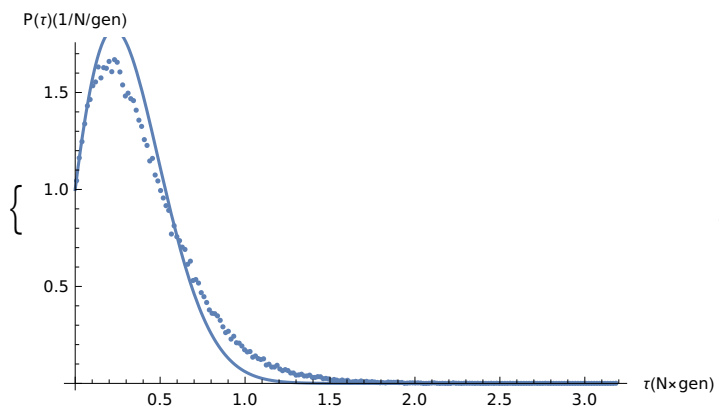
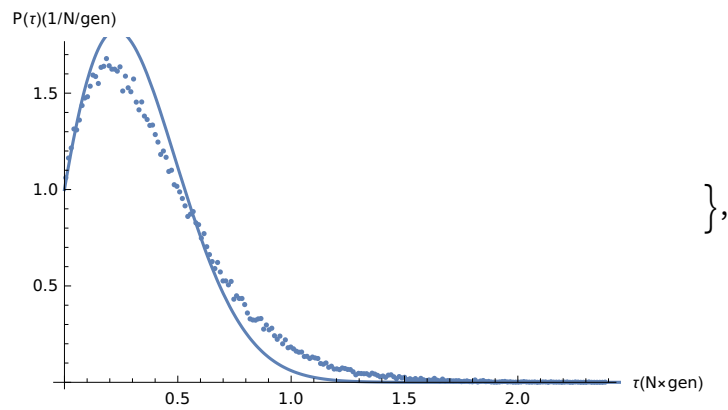


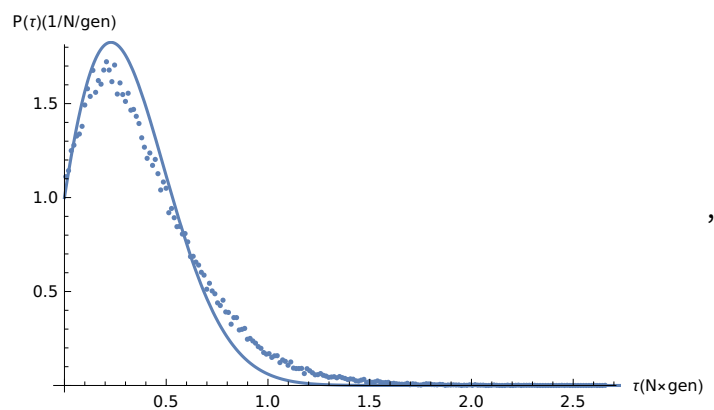
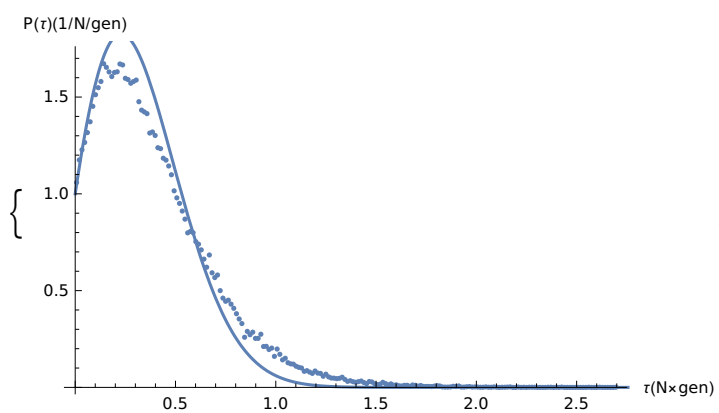
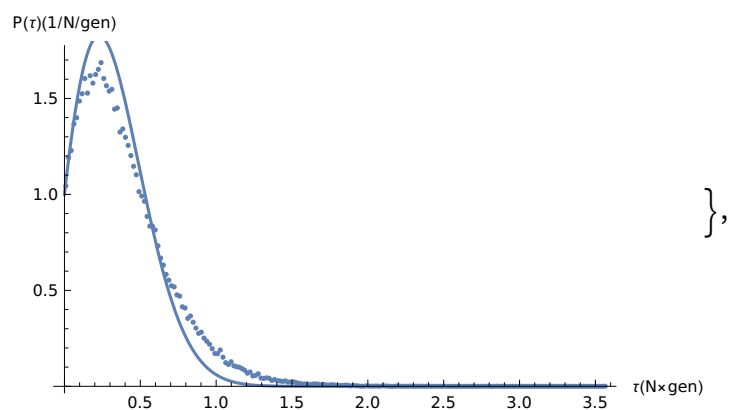
```

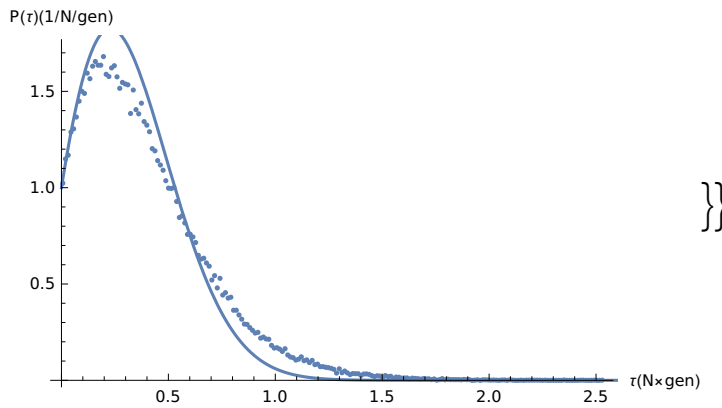
In[8]:= With[{idx0 = 6}, Table[Table[
  Show[ListPlot[histograms[[idx0, idx1, idx2]], ImageSize → Medium,
    PlotRange → All, AxesLabel → {"τ(N×gen)", "P(τ)(1/N/gen)"}, Plot[
    (combinedParameters[[idx0]] * tau + 1) Exp[-combinedParameters[[idx0]] / 2 * tau^2 - tau],
    {tau, 0, Transpose[Max[histograms[[idx0, 1, 1]]][[1]], PlotRange → All}],
    {idx2, Length[populationSizes]], {idx1, Length[sequenceLengths]]}]

```









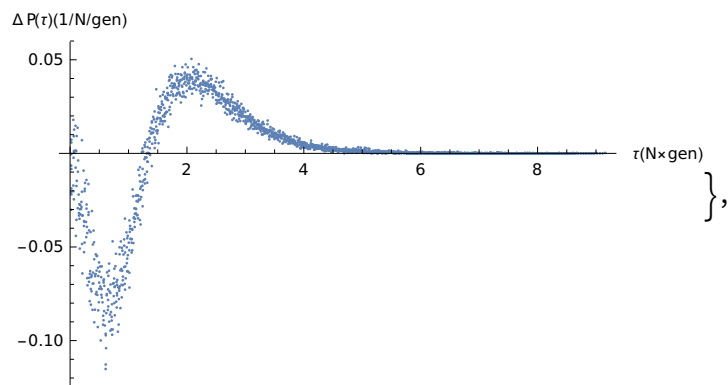
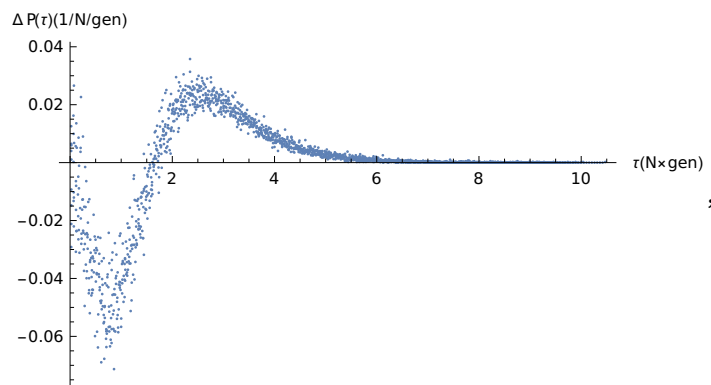
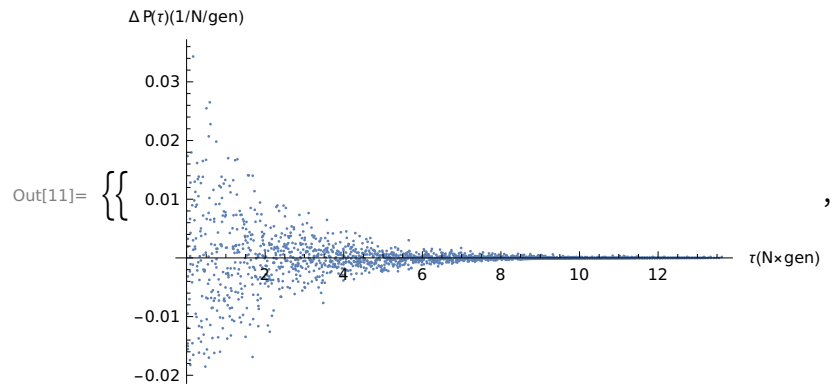
Plot the errors

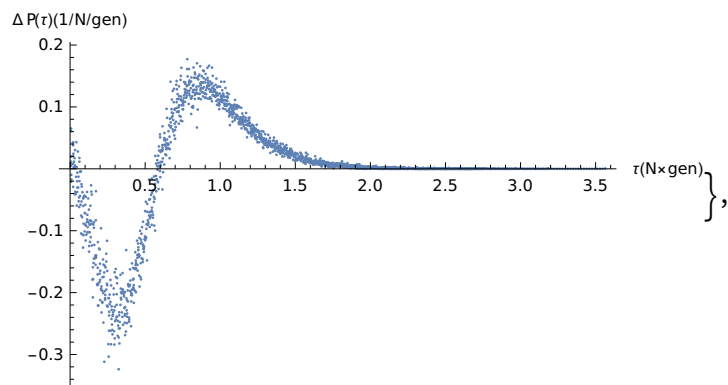
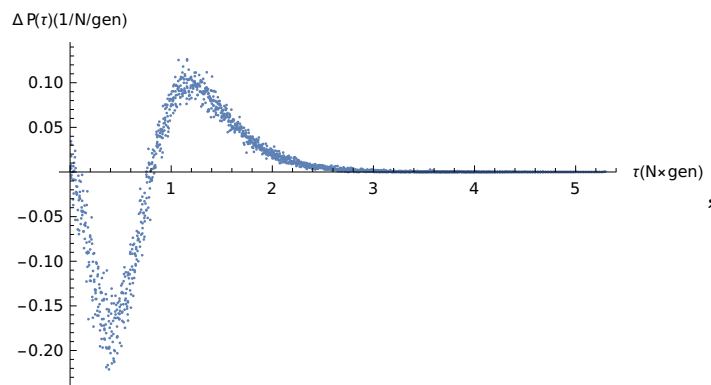
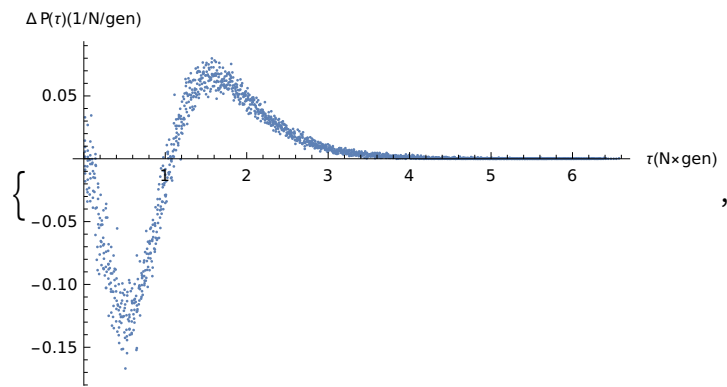
```

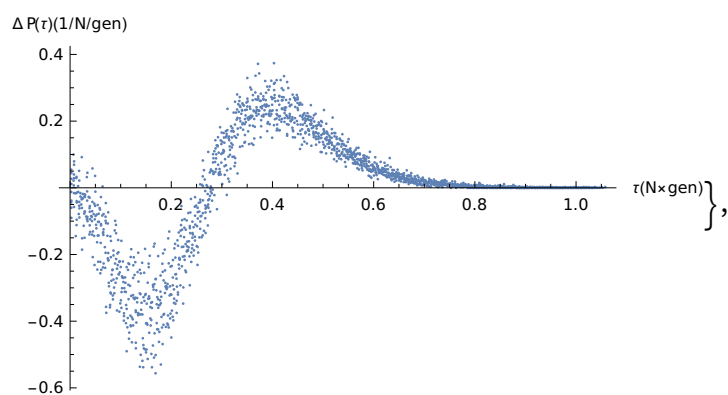
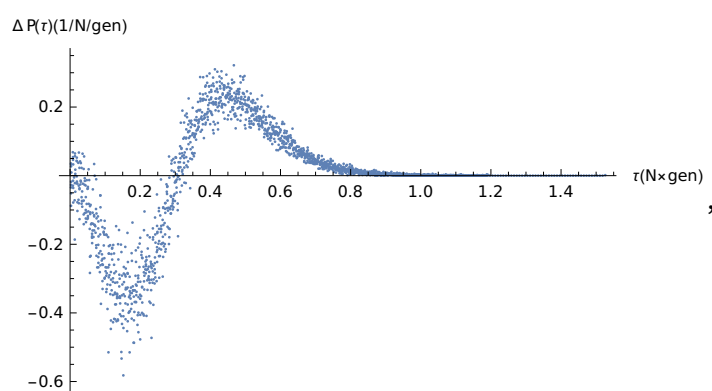
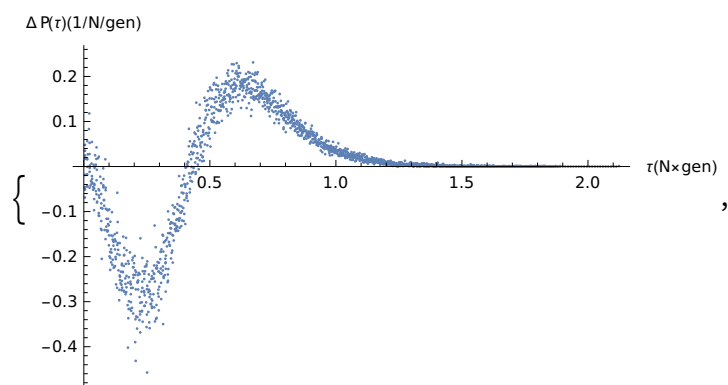
In[9]:= errors = Table[
  Flatten[Table[Table[histograms[[idx0, idx1, idx2]], {idx2, Length[populationSizes]}],
    {idx1, Length[sequenceLengths]}, 2], {idx0, Length[combinedParameters]}];
Do[Do[errors[[idx0, idx1]] = {errors[[idx0, idx1, 1]],
  errors[[idx0, idx1, 2]] - prediction[errors[[idx0, idx1, 1]], combinedParameters[[idx0]]],
  {idx1, Length[errors[[idx0]]]}], {idx0, Length[combinedParameters]}];

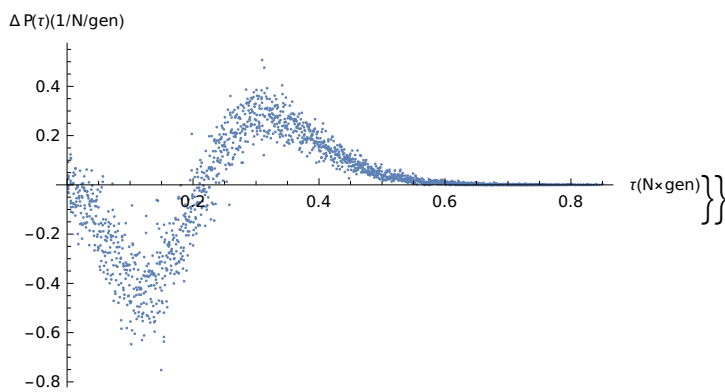
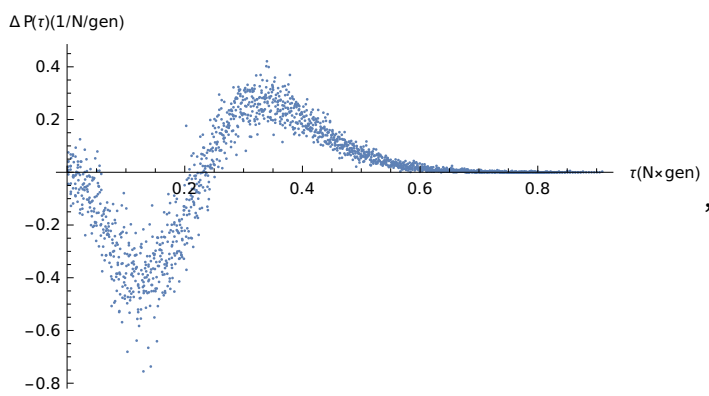
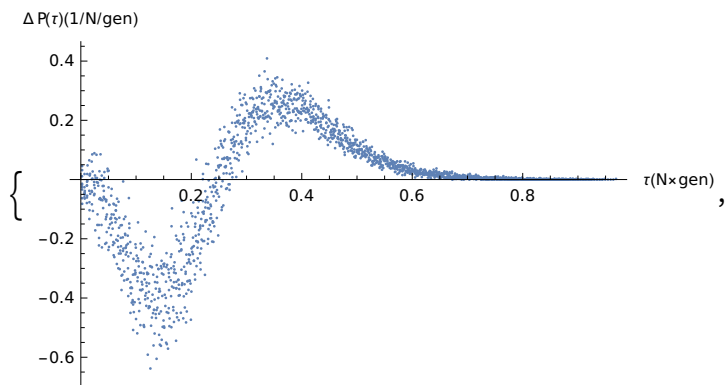
In[11]:= Table[Table[
  ListPlot[errors[[3 * (idx1 - 1) + idx2]], ImageSize → Medium,
  PlotRange → All, AxesLabel → {"τ(N×gen)", "ΔP(τ)(1/N/gen)"}], {idx2, 3}],
  {idx1, Ceiling[Length[combinedParameters] / 3]}];

```









Fit scaling factors

```
In[12]:= predictionFree[tau_, gamma_, beta_, alpha_, combinedParameter_] :=
  (3 gamma * tau ^ 2 + beta * combinedParameter * tau + alpha) *
  Exp[-gamma * tau ^ 3 - beta * combinedParameter * tau ^ 2 / 2 - alpha * tau]
```

指数形式

```

In[13]:= gammas = Table[0, {idx, Length[combinedParameters]}];
           | 表格          | 長度
betas = Table[0, {idx, Length[combinedParameters]}];
           | 表格          | 長度
alphas = Table[0, {idx, Length[combinedParameters]}];
           | 表格          | 長度
Module[{fit = Table[0, {idx0, Length[combinedParameters]}]}, Do[
  | 模組          | 表格          | 長度          | Do迴圈
  fit[[idx0]] = NonlinearModelFit[
    | 壓平          | 表格          | 表格          | 長度
    Flatten[Table[Table[histograms[[idx0, idx1, idx2]], {idx2, Length[populationSizes]}],
      {idx1, Length[sequenceLengths]}, 2],
    | 長度
    predictionFree[tau, gamma, beta, alpha, combinedParameters[[idx0]]],
    {gamma, beta, alpha}, tau];
  gammas[[idx0]] = fit[[idx0]]["ParameterTable"][[1, 1, 2, 2]];
  betas[[idx0]] = fit[[idx0]]["ParameterTable"][[1, 1, 3, 2]];
  alphas[[idx0]] = fit[[idx0]]["ParameterTable"][[1, 1, 4, 2]],
  {idx0, Length[combinedParameters]}]]
           | 長度

```

... General: Exp[-6525.05] is too small to represent as a normalized machine number; precision may be lost.

... General: Exp[-6525.05] is too small to represent as a normalized machine number; precision may be lost.

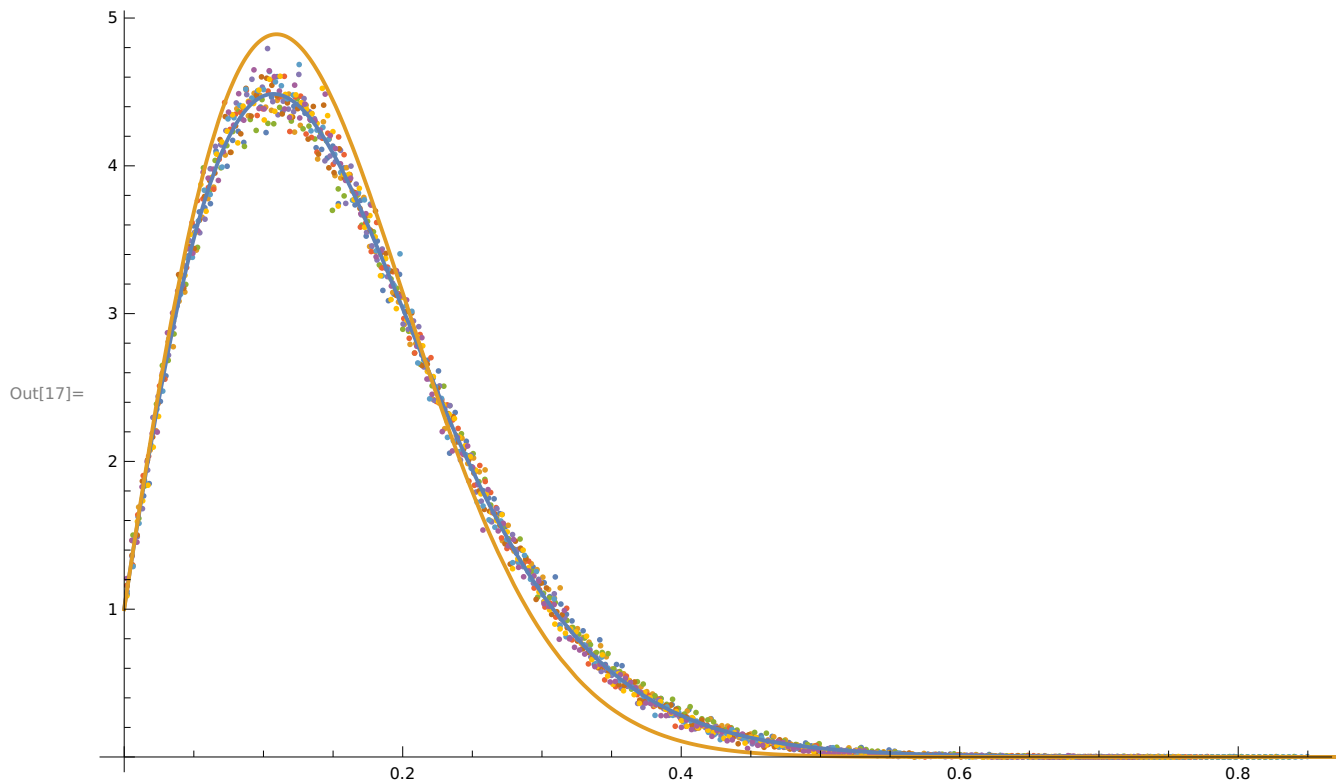
... General: Exp[-6525.05] is too small to represent as a normalized machine number; precision may be lost.

... General: Further output of General::munfl will be suppressed during this calculation.

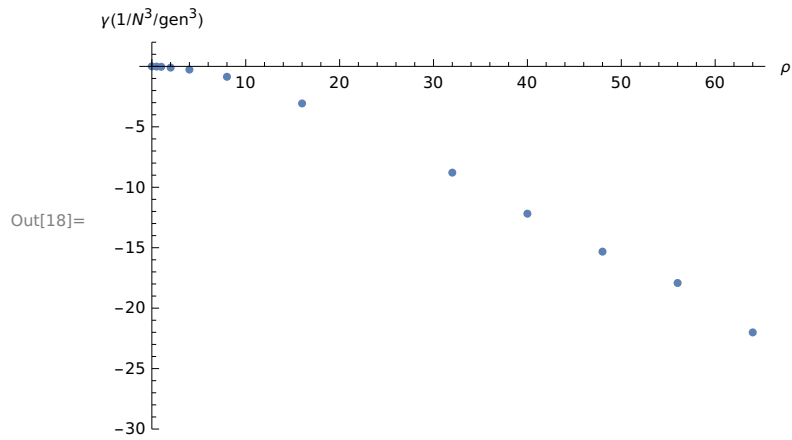
```

In[17]:= With[{idx0 = 12}, Show[ListPlot[
  Flatten[Table[Table[histograms[[idx0, idx1, idx2]], {idx2, Length[populationSizes]}],
    {idx1, Length[sequenceLengths]}], 1], ImageSize → Full, PlotRange → All],
  Plot[{predictionFree[tau, gammas[[idx0]], betas[[idx0]], alphas[[idx0]],
    combinedParameters[[idx0]]}, predictionFree[tau, 0, 1, 1, combinedParameters[[idx0]]],
    {tau, 0, Transpose[Max[histograms[[idx0, 1, 1]]][[1]]}, PlotRange → All,
    PlotStyle → Thick, AxesLabel → {" $\tau(N \times \text{gen})$ ", " $P(\tau(1/N/\text{gen}))$ "}]]

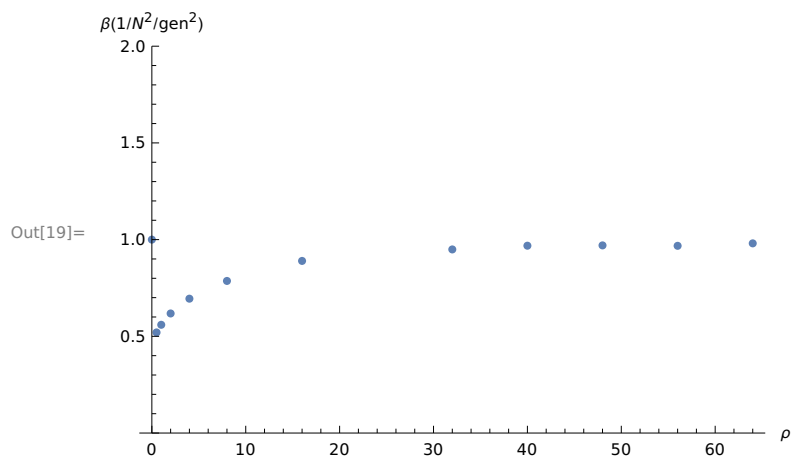
```



```
In[18]:= ListPlot[Transpose[{combinedParameters, gammas}],
  點集圖 轉置
  PlotRange → {-30, 2}, AxesLabel → {" $\rho$ ", " $\gamma(1/N^3/\text{gen}^3)$ "}]
  繪製範圍 座標軸標籤
```



```
In[19]:= ListPlot[Transpose[{combinedParameters, betas}],
  點集圖 轉置
  PlotRange → {0, 2}, AxesLabel → {" $\rho$ ", " $\beta(1/N^2/\text{gen}^2)$ "}]
  繪製範圍 座標軸標籤
```



```
In[20]:= ListPlot[Transpose[{combinedParameters, alphas}],
  點集圖 轉置
  PlotRange → {0, 2}, AxesLabel → {" $\rho$ ", " $\alpha(1/N/gen)$ "}
  繪製範圍 座標軸標籤 數值化
```

