

Pensieve header: This is the main notebook for the nb2tex project, containing both the documentation and the implementation.

## To do

The phrase “ $\wedge$  FreeQ[c, \_Cell, {1,  $\infty$ }]” within the program seems unnecessary, and is presently commented out. Remove or justify!

Insert definitions for `\nbpdfPrint` and for `\nbpdfText`.

## Experimentation

```
In[ ]:= SetDirectory["C:\\drorbn\\AcademicPensieve\\Projects\\nb2tex"]
Out[ ]=
C:\drorbn\AcademicPensieve\Projects\nb2tex

In[ ]:= nb = NotebookGet[NotebookOpen@FileNameJoin[{Directory[], "nb2tex.nb"}]];
nb[[1, 1]]
Out[ ]=
Cell[
  Pensieve header: This is the main notebook for the nb2tex project, containing both the
  documentation and the implementation., Text, CellChangeTimes ->
  {{3.79032  $\times 10^9$ , 3.79032  $\times 10^9$ }, {3.79035  $\times 10^9$ , 3.79035  $\times 10^9$ }, {3.79035  $\times 10^9$ , 3.79035  $\times 10^9$ }}]

In[ ]:= Cases[nb, c_Cell /; FreeQ[c, _Cell, {1,  $\infty$ }],  $\infty$ ] [[11]]
Out[ ]=
Cell[
  BoxData[FormBox[StyleBox[RowBox[{L, StyleBox[AdjustmentBox[A, BoxBaselineShift -> -0.4,
    BoxMargins -> {{-0.5, -0.3}, {0, 0}}], FontSize -> Smaller], T,
    AdjustmentBox[E, BoxBaselineShift -> 0.5, BoxMargins -> {{-0.3, 0}, {0, 0}}], X]],
    SingleLetterItalics -> False], TraditionalForm]]]
```

```
In[*]:= Table[
  type = cell[[2]];
  tag = CellTags /. Cases[cell, _Rule] /. CellTags -> "";
  {type, tag},
  {cell, Cases[nb, c_Cell /; Length[c] ≥ 2 ∧ FreeQ[c, _Cell, {1, ∞}], ∞]}
]
```

```
Out[*]=
{{Text, }, {Subsection, }, {Input, }, {Output, }, {Input, }, {Output, }, {Input, },
 {Output, }, {Input, }, {Output, }, {Text, tex}, {Text, tex}, {Text, tex},
 {Subsection, pdf}, {Text, tex}, {Text, tex}, {Text, tex}, {Text, }, {Text, tex},
 {Input, pdf}, {Echo, pdf}, {Output, pdf}, {Input, pdf}, {Output, pdf}, {Text, tex},
 {Input, pdfgraph}, {Output, pdfgraph}, {Text, tex}, {Input, pdf}, {Text, tex},
 {Text, tex}, {Text, exec}, {Input, pdf}, {Output, pdf}, {Text, exec}, {Subsection, pdf},
 {Input, pdf}, {Subsection, pdf}, {Input, pdf}, {Message, pdf}, {Message, pdf},
 {Message, pdf}, {Message, pdf}, {Message, pdf}, {Message, pdf}, {Message, pdf},
 {Message, pdf}, {Message, pdf}, {Message, pdf}, {Output, pdf}, {Text, tex}}
```

```
In[*]:= PDFWidth = 7.2;
PDFFolder = "Sample";
If[FileType[PDFFolder] === None, CreateDirectory[PDFFolder]];
PDFCounter = 0;
lines = Table[
  type = cell[[2]];
  tag = CellTags /. List@@cell[[3 ;;]] /. CellTags -> "";
  Which[
    type == "Text" ∧ tag == "tex", cell[[1],
    StringMatchQ[tag, "pdf" ~~ ___], (
      pdfname = PDFFolder <> "/" <> ToString[++PDFCounter] <> ".pdf";
      Export[pdfname, Append[cell, PageWidth -> 108 PDFWidth]];
      StringReplace[
        "\noindent\nbpdfXXXType{pdfname}",
        {"XXX" -> StringDrop[tag, 3], "Type" -> type, "pdfname" -> pdfname}
      ]
    ),
    type == "Text" ∧ tag == "exec", ToExpression[cell[[1]]; "",
    True, ""
  ],
  {cell, Cases[nb, c_Cell /; FreeQ[c, _Cell, {1, ∞}], ∞]}
];
StringJoin@@Riffle[DeleteCases[lines, ""], "\n\n"]
```

```
Out[*]=
\documentclass[12pt,reqno]{amsart}
\usepackage{graphicx}
\usepackage[textwidth=6.5in,textheight=9in,headsep=0.15in,centering]{geometry}

\def\nbpdfInput#1{\vskip 1mm\noindent\includegraphics{#1}}
```

```

\def\nbpdfEcho#1{\vskip 1mm\noindent\includegraphics{#1}}
\def\nbpdfOutput#1{\vskip 1mm\noindent\includegraphics{#1}}
\def\nbpdfgraphInput#1{\vskip 1mm\noindent\includegraphics{#1}}
\def\nbpdfgraphOutput#1{\vskip 1mm\noindent\includegraphics{#1}}

\begin{document}

```

The nb2tex project aims to write a converter that takes Mathematica notebooks and converts them into latex files.

Text cells with tag ``tex'' become verbatim tex output. They may include anything texish --- like formulas  $1+1=2$ , or anything else.

Untagged cells are ignored; for example, the following one should not appear in the latex result:

Cells with tag ``pdf'' are converted into numbered pdf files in a pdf-subfolder (default name: same as the notebook's name; in this case, ``Sample''). The latex produced is `\verb$\nbpdfType{Sample/nn.pdf}`, where `\verb$Type$` is the type of the current cell (`\verb$Text$`, `\verb$Input$`, `\verb$Output$`, `\verb$Echo$`, etc.), and `\verb$nnn$` is the number of the current pdf file.

For example:

```
\noindent\nbpdfInput{Sample/1.pdf}
```

```
\noindent\nbpdfEcho{Sample/2.pdf}
```

```
\noindent\nbpdfOutput{Sample/3.pdf}
```

```
\noindent\nbpdfInput{Sample/4.pdf}
```

```
\noindent\nbpdfOutput{Sample/5.pdf}
```

If a tag is of the form ``pdfXXX'', the string XXX gets added to the `\verb$\nbpdf$` command, so it becomes `\verb$\nbpdfXXXType$`. This is useful for graphics inclusions, for example, where a useful tag would be ``pdfgraph'':

```
\noindent\nbpdfgraphInput{Sample/6.pdf}
```

```
\noindent\nbpdfgraphOutput{Sample/7.pdf}
```

Invoking nb2tex (suffixes are automatically added and should not be included):

```
\noindent\nbpdfInput{Sample/8.pdf}
```

Valid options include:

```

\begin{itemize}
\item \verb$"PDFFolder" -> foldername$ (a string).
\item \verb$"PDFWidth" -> width$ (in inches).
\end{itemize}

```

Text cells with tag ``exec'' get executed using `\verb$ToExpression$` at the time of their processing, with no output produced. This is useful for setting / re-setting options within the notebook itself. For example, a text cell with tag `exec` and content `\verb"nb2tex$PDFWidth=10"` will allow very wide outputs:

```

\noindent\nbpdfgraphInput{Sample/9.pdf}

\noindent\nbpdfgraphOutput{Sample/10.pdf}

\end{document}

\noindent\nbpdfInput{Sample/11.pdf}

```

## L<sup>A</sup>T<sub>E</sub>X Prologue

tex

```

\documentclass[12pt,reqno]{amsart}
\usepackage[export]{adjustbox} % This also includes graphicx.
\usepackage{needspace}
\usepackage[textwidth=6.5in,textheight=9in,headsep=0.15in,centering]{geometry}

```

tex

```

\def\nbpdfInput#1{\vskip 1mm\par\noindent\includegraphics{#1}}
\def\nbpdfEcho#1{\vskip 1mm\par\noindent\includegraphics{#1}}
\def\nbpdfPrint#1{\vskip 1mm\par\noindent\includegraphics{#1}}
\def\nbpdfText#1{\vskip 1mm\par\noindent\includegraphics{#1}}
\def\nbpdfMessage#1{\vskip 1mm\par\noindent\includegraphics{#1}}
\def\nbpdfOutput#1{\vskip 1mm\par\noindent\includegraphics{#1}}
\def\nbpdfSubsection#1{\vskip 1mm\par\noindent\includegraphics{#1}}
\def\nbpdfgraphInput#1{\vskip 1mm\par\noindent\includegraphics{#1}}
\def\nbpdfgraphOutput#1{\vskip 1mm\par\noindent\includegraphics[width=1.5in]{#1}}

```

tex

```

\begin{document}

```

pdf

## Documentation

tex

The nb2tex project aims to write a converter that takes Mathematica notebooks and converts them into latex files.

Text cells with tag ``tex'' become verbatim tex output. They may include anything texish --- like formulas  $1+1=2$ , or anything else.

Untagged cells are ignored; for example, the following one should not appear in the latex result:

This cell must not appear in the latex output.

tex

Cells with tag ``pdf'' are converted into numbered pdf files in a pdf-subfolder (default name: same as the notebook's name; in this case, ``Sample''). The latex produced is  $\verb$\nbpdfType{Sample/nnn.pdf}$$ , where  $\verb$Type$$  is the type of the current cell ( $\verb$Text$$ ,  $\verb$Input$$ ,  $\verb$Output$$ ,  $\verb$Echo$$ , etc.), and  $\verb$nnn$$  is the number of the current pdf file.

For example:

pdf

```
In[ ]:= binom = Echo [ (a + b)32 ] // Expand
```

pdf

```
» (a + b)32
```

Out[ ]=

pdf

$$a^{32} + 32 a^{31} b + 496 a^{30} b^2 + 4960 a^{29} b^3 + 35960 a^{28} b^4 + 201376 a^{27} b^5 + 906192 a^{26} b^6 + 3365856 a^{25} b^7 + 10518300 a^{24} b^8 + 28048800 a^{23} b^9 + 64512240 a^{22} b^{10} + 129024480 a^{21} b^{11} + 225792840 a^{20} b^{12} + 347373600 a^{19} b^{13} + 471435600 a^{18} b^{14} + 565722720 a^{17} b^{15} + 601080390 a^{16} b^{16} + 565722720 a^{15} b^{17} + 471435600 a^{14} b^{18} + 347373600 a^{13} b^{19} + 225792840 a^{12} b^{20} + 129024480 a^{11} b^{21} + 64512240 a^{10} b^{22} + 28048800 a^9 b^{23} + 10518300 a^8 b^{24} + 3365856 a^7 b^{25} + 906192 a^6 b^{26} + 201376 a^5 b^{27} + 35960 a^4 b^{28} + 4960 a^3 b^{29} + 496 a^2 b^{30} + 32 a b^{31} + b^{32}$$

```
\verb$Series[1/(1+x),{x,0,128}]$
```

```
Series [ 1 / ( 1 + x ) , { x , 0 , 128 } ]
```

Out[ ]=

$$1 - x + x^2 - x^3 + x^4 - x^5 + x^6 - x^7 + x^8 - x^9 + x^{10} - x^{11} + x^{12} - x^{13} + x^{14} - x^{15} + x^{16} - x^{17} + x^{18} - x^{19} + x^{20} - x^{21} + x^{22} - x^{23} + x^{24} - x^{25} + x^{26} - x^{27} + x^{28} - x^{29} + x^{30} - x^{31} + x^{32} - x^{33} + x^{34} - x^{35} + x^{36} - x^{37} + x^{38} - x^{39} + x^{40} - x^{41} + x^{42} - x^{43} + x^{44} - x^{45} + x^{46} - x^{47} + x^{48} - x^{49} + x^{50} - x^{51} + x^{52} - x^{53} + x^{54} - x^{55} + x^{56} - x^{57} + x^{58} - x^{59} + x^{60} - x^{61} + x^{62} - x^{63} + x^{64} - x^{65} + x^{66} - x^{67} + x^{68} - x^{69} + x^{70} - x^{71} + x^{72} - x^{73} + x^{74} - x^{75} + x^{76} - x^{77} + x^{78} - x^{79} + x^{80} - x^{81} + x^{82} - x^{83} + x^{84} - x^{85} + x^{86} - x^{87} + x^{88} - x^{89} + x^{90} - x^{91} + x^{92} - x^{93} + x^{94} - x^{95} + x^{96} - x^{97} + x^{98} - x^{99} + x^{100} - x^{101} + x^{102} - x^{103} + x^{104} - x^{105} + x^{106} - x^{107} + x^{108} - x^{109} + x^{110} - x^{111} + x^{112} - x^{113} + x^{114} - x^{115} + x^{116} - x^{117} + x^{118} - x^{119} + x^{120} - x^{121} + x^{122} - x^{123} + x^{124} - x^{125} + x^{126} - x^{127} + x^{128} + O[x]^{129}$$

tex

If a tag is of the form ``pdf:Name'', a pdf file by the name ``NameType.pdf'' is created in the pdf folder (where Type is the type of the cell), yet nothing is added to the tex file. This allows to treat certain cells in a special manner. For example, using latex commands that will inline them or use them as side figure. As an example, if the Mathematica input is  $\includegraphics[valign=t]{Snips/FactorialInput}$ , the output is  $\includegraphics[valign=t]{Snips/FactorialOutput}$ .

(Alt) In[ ]:=  
pdf:Factorial

**20!**

(Alt) Out[ ]:=  
pdf:Factorial

2 432 902 008 176 640 000

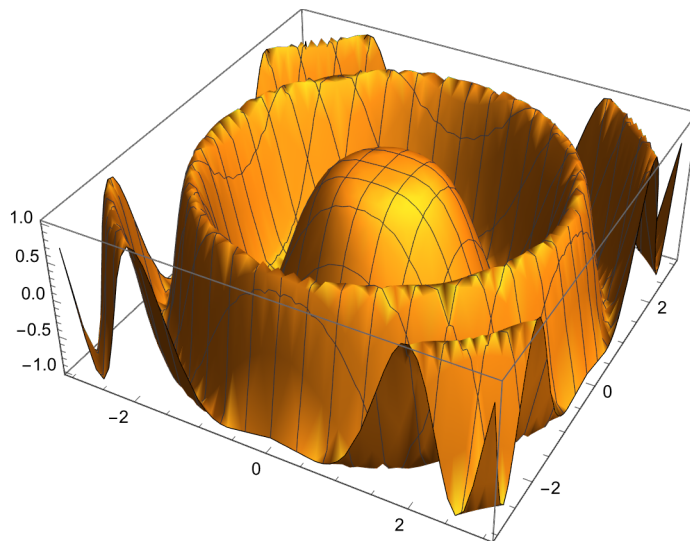
tex

\par If a tag is of the form ``pdfXXX'', with XXX a string not beginning with the character ``, the string XXX gets added to the \verb\$\nbpdf\$ command, so it becomes \verb\$\nbpdfXXXType\$. This is useful for graphics inclusions, for example, where a useful tag would be ``pdfgraph'':

pdfgraph

```
In[ ]:= plot = Plot3D[Cos[x2 + y2], {x, -3, 3}, {y, -3, 3}]
```

Out[ ]:=  
pdfgraph



tex

\par Invoking nb2tex (suffixes are automatically added and should not be included):

pdf

```
nb2tex[nb_String, opts___Rule];  
nb2tex[nb_String, tex_String, opts___Rule];
```

tex

\par Valid options include:

```
\begin{itemize}
```

```
\item \verb$"PDFFolder" -> foldername$ (a string).
```

```
\item \verb$"PDFWidth" -> width$ (in inches).
```

```
\end{itemize}
```

Input cells with tag ``exec'' get executed using \verb\$ToExpression\$ at the time of their processing (even if they do not have the property ``Evaluatable''), with no output produced. This is useful for setting / re-setting options within the notebook itself. For example, an input cell with tag exec and content \verb"nb2tex\$PDFWidth=10" will allow very wide outputs:

exec

`In[ ] := nb2tex$PDFWidth = 10`

tex

`\needspace{25mm}`

pdf

`In[ ] := binom`

Out[ ] :=

pdf

$$\begin{aligned}
& a^{32} + 32 a^{31} b + 496 a^{30} b^2 + 4960 a^{29} b^3 + 35960 a^{28} b^4 + 201376 a^{27} b^5 + 906192 a^{26} b^6 + 3365856 a^{25} b^7 + \\
& 10518300 a^{24} b^8 + 28048800 a^{23} b^9 + 64512240 a^{22} b^{10} + 129024480 a^{21} b^{11} + 225792840 a^{20} b^{12} + \\
& 347373600 a^{19} b^{13} + 471435600 a^{18} b^{14} + 565722720 a^{17} b^{15} + 601080390 a^{16} b^{16} + \\
& 565722720 a^{15} b^{17} + 471435600 a^{14} b^{18} + 347373600 a^{13} b^{19} + 225792840 a^{12} b^{20} + \\
& 129024480 a^{11} b^{21} + 64512240 a^{10} b^{22} + 28048800 a^9 b^{23} + 10518300 a^8 b^{24} + 3365856 a^7 b^{25} + \\
& 906192 a^6 b^{26} + 201376 a^5 b^{27} + 35960 a^4 b^{28} + 4960 a^3 b^{29} + 496 a^2 b^{30} + 32 a b^{31} + b^{32}
\end{aligned}$$

exec

`nb2tex$PDFWidth = 6.5`

tex

\par Similarly, changing `\verb"nb2tex$TeXFileName"` will change the file where the latex output is written.

pdf

## Implementation

As in <http://drorbn.net/AcademicPensieve/Projects/nb2tex/>.

(Alt) In[ ] :=

pdf

```

SetOptions[$FrontEndSession, PrintingStyleEnvironment -> "Working"];
nb2tex[nb_String, opts___Rule] := nb2tex[nb, nb, opts];

```

(Alt) In[ ]:=  
pdf

```

nb2tex[nb_String, tex_String, opts__Rule] := Module[
  {notebook, PDFCounter = 0, type,
   tag, pdfname, cells, cell, c, c1, texfiles = {}, TeXOut,
   PDFFolder = PDFFolder /. {opts} /. PDFFolder → nb
  },
  nb2tex$TeXFileName = tex <> ".tex";
  nb2tex$PDFWidth = PDFWidth /. {opts} /. PDFWidth → 6.5;
  TeXOut[s_String] := (texfiles = texfiles ∪ {nb2tex$TeXFileName};
   WriteString[nb2tex$TeXFileName, s]);
  notebook = NotebookGet[NotebookOpen@FileNameJoin[{Directory[], nb <> ".nb"}]];
  If[FileType[PDFFolder] === None, CreateDirectory[PDFFolder]];
  DeleteFile /@ FileNames["*.pdf", PDFFolder];
  cells = Cases[notebook, c_Cell /; Length[c] ≥ 2, ∞];
  Do[
    type = cell[[2]];
    tag = CellTags /. Cases[cell, _Rule] /. CellTags → "";
    Which[
      type == "Text" ^ tag == "tex", TeXOut[
        StringReplace[cell[[1]], {"'" → "'", "\"" → "\""}] <> "\n\n",
        StringMatchQ[tag, "pdf:" ~~ ___], (
          pdfname = PDFFolder <> "/" <> StringDrop[tag, 4] <> type <> ".pdf";
          Export[pdfname, Join[cell, Cell[PageWidth → 80 nb2tex$PDFWidth / 0.75]]];
          c1 = "c:\\drorbn\\bin\\cpdf.exe -scale-page \"0.75 0.75\" " <>
            pdfname <> " -o " <> pdfname;
          Close@OpenRead["!" <> c1];
        ),
      StringMatchQ[tag, "pdf" ~~ ___], (
          pdfname = PDFFolder <> "/" <> ToString[++PDFCounter] <> ".pdf";
          Export[pdfname, Join[cell, Cell[PageWidth → 80 nb2tex$PDFWidth / 0.75]]];
          c1 = "c:\\drorbn\\bin\\cpdf.exe -scale-page \"0.75 0.75\" " <>
            pdfname <> " -o " <> pdfname;
          Close@OpenRead["!" <> c1];
          TeXOut[StringReplace[
            "\\nbpdfXXXType{pdfname}\n",
            {"XXX" → StringDrop[tag, 3], "Type" → type, "pdfname" → pdfname}
          ]]
        ),
      type == "Input" ^ tag == "exec", ToExpression[cell[[1]],
      True, Null
    ],
    {cell, cells}
  ];
  Close /@ texfiles;
]

```



pdf

## Run

(Alt) In[ ]:=  
pdf

```
SetDirectory["C:\\drorbn\\AcademicPensieve\\Projects\\nb2tex"];  
nb2tex["nb2tex", PDFFolder -> "Snips"];  
Run@  
  "\\C:\\Users\\drorb\\AppData\\Local\\Programs\\MiKTeX\\miktex\\bin\\x64\\pdflatex.exe\  
  nb2tex.tex"
```

(Alt) Out[ ]=  
pdf

0

## L<sup>A</sup>T<sub>E</sub>X Epilogue

tex

```
\end{document}
```