MAA Figure Instructions

Contents

DISCLAIMER: Authors are responsible for the figures they sent to the MAA for publication in their manuscript. These instructions are tools to assist authors in the creation of their figures. The graphic specifications outline the expectations that the MAA have. The other resources for creating EPS figure files are just that, resources. MAA Staff are not experts in these programs and will not be able to assist you with them. We want your figures and graphics to look their best online and in print.

MAA Graphic Specifications

These instructions apply to the following MAA Publications: *The American Mathematical Monthly*, *Mathematic Magazine*, and *The College Mathematics Journal*.

Figures submitted with manuscripts can be either grayscale or in color. If color graphics are included with the submission, they will be used for the online publication only and converted to grayscale for print if applicable.

If the author wishes to receive a quote to have color images printed, please let the editor know.

Please follow the following guidelines to ensure that your figures look their best online and in print.

Figure Guidelines

1. **Line Weight** – should be no less than .5 pt and rarely thicker than 1 pt. Please note that TiKZ's default is .3 pts, which is printable but very thin.

2. **Times New Roman** – is the appropriate font to use in graphic images. Use italic, normal, or bold so that your text is similar to the text in the body of your manuscript.
3. **Font Size** – 9 pt for labels and text & 8 pt for axes.
4. **Resolution** – 300 dpi. High resolution bitmaps are acceptable as long as you use the correct fonts, font size, and line weight. Bitmaps also must be the appropriate size for your paper. DO NOT scale your Bitmaps in LaTeX.
5. **Journal Paper Size for printed journals** – the text width is 5 inches and text length is 8 inches on a page. Figures cannot be greater than 5 inches wide or 8 inches long.
6. Line art will be reproduced best if provided in vector form, file extensions are EPS or SVG.
7. If using a drawing program, please EXPORT your figures from the software instead of using Save As.
8. Creating a PDF does not affect whether the graphic is a bitmap or vector; saving a scanned piece of line art as PDF does not convert it to editable vector line art.
9. If you generate graphics using a TeX package, such as TiKZ, please provide a PDF of the manuscript with the TeX file of the graphic. In the production process, TeX-generated graphics will be converted to more conventional graphics.

Vector Graphics vs. Bitmap Graphics

1. **Vector File**:
    - Vector graphics are made up of mathematical equations that define shapes, lines, and colors.
    - They are resolution-independent, meaning they can be scaled to any size without losing quality.
    - They are best suited for designs that require scalability and precision, such as logos, illustrations, and diagrams.
    - Common vector file formats include SVG and EPS.
2. **Bitmap (Raster) File**:
    - Bitmap graphics are composed of a grid of individual pixels, each assigned a color value.
    - They are resolution-dependent, meaning their quality is fixed and can degrade when scaled up.
    - They are suitable for photographs and images with complex color gradients or textures.
    - Common bitmap file formats include JPEG, PNG, TIFF, and BMP.

In summary, the main difference lies in how each type of file represents graphics: vectors use mathematical formulas to define shapes, while bitmaps use a grid of pixels to represent images.

Vectors are best for scalable and precise graphics, while bitmaps are better suited for complex images with fine details.

How to tell if an image is a bitmap or a vector file.

You can determine whether a file is a bitmap or a vector by examining its characteristics and properties. Here are some methods to help you identify the file type:

1. **File Extension**:
    - Check the file extension. Common bitmap file extensions include .jpg, .png, .bmp, and .tif, while vector file extensions include .svg and .eps. However, note that file extensions alone may not always accurately represent the file type.
2. **File Size**:
    - Bitmap files tend to have larger file sizes compared to vector files, especially at higher resolutions. But that is not definitive proof it is a bitmap. Low resolutions bitmaps can be small files.
3. **Scalability**:
    - Try scaling the image to a larger size. If the image maintains its clarity and sharpness without pixelation or loss of quality, it's likely a vector file. Bitmaps, on the other hand, will lose quality and become pixelated when scaled up.
4. **Zoom Level**:
    - Zoom in on the image. If the image remains crisp and clear even at high zoom levels, it's probably a vector file. Bitmaps will appear pixelated when zoomed in.
5. **Editing Capability**:
    - Open the file in a vector graphics editor like Adobe Illustrator or Inkscape. If you can easily edit individual shapes, lines, and colors without loss of quality, it's a vector file. For a bitmap you would have to choose the eraser tool and erase a line. For a vector you can choose the line and edit it or delete it.
6. **Complexity of Images**:
    - Vector files are best suited for simple graphics with crisp lines and solid colors, such as logos, icons, and diagrams. If the image contains complex gradients, textures, or photographic elements, it's likely a bitmap.

LaTeX Drawing Programs to Create EPS Files

TiKZ

TiKZ is able to create vector graphics. To submit TiKZ graphics, please do the following so your graphics will look their best.

- Please make sure your line weight is a minimum of .5 pt.
  ```
  \draw [line width=.5pt]
  \draw [semithick] (this should produce a line that is 0.6pt.
  \draw [thick] (this should produce a line that is 0.8pt.
  \draw [verythick] (this should produce a line that is 1.2pt.
  ```
- Fonts. Please make sure that your fonts are the correct size (9pt for labels and 8pt for axis).
- Please provide TeX files and PDF files of each TiKZ graphic with your final TeX and PDF manuscript.

Please be aware that if you use TiKZ (or any other LaTeX draw program) to create your figures, they will have to be extracted and converted to EPS and PDF files for production. We prefer that you do this before sending in your final files.

Convert PDF Figures to EPS using Adobe Illustrator

1. **Export TiKZ as PDF**:
   - Compile your TiKZ code to generate a PDF file.
   - Ensure that the PDF contains only the TiKZ figure without any additional elements or page margins.
2. **Open Adobe Illustrator**:
   - Launch Adobe Illustrator on your computer.
3. **Import PDF File**:
   - Select "File" > "Open" and navigate to the location of your TiKZ PDF file.
   - Choose the PDF file and click "Open."
4. **Edit Preferences (Optional)**:
   - Before proceeding, you may want to adjust some preferences. Go to "Edit" > "Preferences" > "General" (Windows) or "Illustrator" > "Preferences" > "General" (Mac).
   - Ensure that "Scale Strokes & Effects" is unchecked if you want to maintain the line weight from the TiKZ file.

5. **Select and Ungroup (Optional)**:
    - Click on the TiKZ figure to select it.
    - If the TiKZ figure is grouped, right-click on it and select "Ungroup" until all elements are ungrouped.
6. **Save as EPS**:
    - Once the TiKZ figure is selected and ungrouped, go to "File" > "Save As."
    - Choose "Illustrator EPS (*.EPS)" as the file format from the dropdown menu.
    - Specify the location and filename for the EPS file.
    - Click "Save."
7. **EPS Options**:
    - In the EPS Options dialog box, you may adjust settings if needed. Generally, the default options should suffice for most cases.
    - Click "OK" to confirm and save the EPS file.
8. **Review and Close**:
    - Review the EPS file to ensure that the conversion from TiKZ to EPS was successful.
    - Close Adobe Illustrator once you've confirmed the EPS file's accuracy.

Convert PDF Figures to EPS using CorelDRAW

1. **Export TiKZ as PDF**:
    - Compile your TiKZ code to generate a PDF file.
    - Ensure that the PDF contains only the TiKZ figure without any additional elements or page margins.
2. **Launch CorelDRAW**:
    - Open CorelDRAW on your computer.
3. **Open the PDF File**:
    - Click on the open file icon and choose PDF as the file type.
    - Browse to the folder with the file and click on the file.
    - It opens with the same file name as before and can then be saved as a CDR with that file name.
4. **Edit as Necessary**:

- Make any required edits to the imported TiKZ figure using CorelDRAW's editing tools. You can adjust colors, line weights, or shapes as needed.

5. **Export as EPS**:
    - Once you're satisfied with the edits, go to "File" > "Export."
    - Choose "Encapsulated PostScript (*.EPS)" as the file format.
    - Specify the location and filename for the EPS file.
    - Click "Save."
6. **EPS Options**:
    - CorelDRAW may prompt you with EPS export options. Adjust settings if needed, such as color mode or resolution.
    - Click "OK" to confirm and save the EPS file.
7. **Review and Close**:
    - Review the EPS file to ensure that the conversion from TiKZ to EPS was successful.
    - Close CorelDRAW once you've confirmed the EPS file's accuracy.

Other ways to convert a TIKZ file to EPS file

1. **Inkscape**:
    - Inkscape is a free and open-source vector graphics editor that supports importing TiKZ files and exporting to EPS format. (https://inkscape.org/)
    - Open the TiKZ file in Inkscape and then save it as an EPS file.
2. **TeXShop**:
    - TeXShop is a LaTeX editor for macOS that includes utilities for processing LaTeX documents.
    - Users can compile their TiKZ code using LaTeX within TeXShop, which can then generate PDF output. Afterward, users can use macOS's built-in PDF capabilities to convert the PDF to EPS format.
3. **MATLAB**:
    - MATLAB, a numerical computing environment, can be used to generate plots and graphics, including those based on mathematical functions.
    - Users can export MATLAB plots to EPS format using MATLAB's built-in export functions.
4. **Online Conversion Tools**:

- There are various online conversion tools available that allow users to convert PDF or other vector graphics formats to EPS.
- Users can upload their TiKZ-generated PDF files to these tools and convert them to EPS format online.

5. **Other Vector Graphics Editors**:
    - Vector graphics editors like Adobe Illustrator, Affinity Designer, or CorelDRAW can also be used to import TiKZ-generated PDF files and save them as EPS files.

Mathematica

Always say your figure as an application file. Make all changes the figure as an application file and EXPORT your figure as a vector graphic.

1. **Create Your Plot**:
    - Write Mathematica code to generate the plot you want. This could involve plotting functions, data points, or any other graphical representation.
    - For example:

```mathematica
Plot[Sin[x], {x, 0, 2*Pi}]
```

2. **Customize Your Plot (Optional):**
    - Customize your plot by adding titles, labels, legends, grid lines, or any other graphical elements using Mathematica's plotting functions.
    - For example:

```mathematica
Plot[Sin[x], {x, 0, 2*Pi},
 PlotStyle -> {Red, Thick},
 PlotRange -> {{0, 2*Pi}, {-1, 1}},
 AxesLabel -> {"x", "sin(x)"},
 PlotLabel -> "Sine Function",
 GridLines -> Automatic]
```

3. **Export to EPS:**
    - your plot looks the way you want it to, you can export it to EPS format.
    - Use the Export function in Mathematica to export the plot to EPS format.

- For example:

```mathematica
Export["my_plot.eps", %]
```

This command exports the most recent output (`'%'`) to the file named `my_plot.eps` in EPS format.

4. **Review the EPS File:**
    - Once the EPS file is generated, you can review it using a suitable viewer or editor to ensure that it looks as expected.
5. **Adjust as Needed (Optional):**

If the EPS file requires further adjustments, you can make changes to your Mathematica code and repeat the export process until you are satisfied with the result.

MATLAB

Always say your figure as an application file. Make all changes the figure as an application file and EXPORT your figure as a vector graphic.

1. **Create Your Plot**:
    - Write MATLAB code to generate the plot you want. This could involve plotting functions, data points, or any other graphical representation.
    - For example:

```matlab
x = linspace(0, 2*pi, 100);
y = sin(x);
plot(x, y);
```

2. **Customize Your Plot** (Optional):
    - Customize your plot by adding titles, labels, legends, grid lines, or any other graphical elements using MATLAB's plotting functions.

- For example:

```matlab
title('Sine Function');
xlabel('x');
ylabel('sin(x)');
grid on;
```

3. **Adjust Figure Properties** (Optional):
    - Adjust the size, font, or any other properties of your figure as desired.
    - For example:

```matlab
set(gcf, 'PaperUnits', 'inches');
set(gcf, 'PaperSize', [6, 4]); % Set paper size to 6×4 inches
```

4. **Export to EPS**:
    - Once your plot looks the way you want it to, you can export it to EPS format.
    - Use the **print** function in MATLAB to export the figure to EPS format.
    - For example:

```matlab
print(gcf, 'my_plot.eps', '-depsc');
```

This command exports the current figure (**gcf**) to the file named **my_plot.eps** in EPS format (**-depsc** option).

5. **Review the EPS File**:
    - Once the EPS file is generated, you can review it using a suitable viewer or editor to ensure that it looks as expected.
6. **Adjust as Needed** (Optional):
    - If the EPS file requires further adjustments, you can make changes to your MATLAB code and repeat the export process until you are satisfied with the result.

Other Resources for Creating EPS Figure Files

1. **Inkscape**: Inkscape is a free and open-source vector graphics editor that supports EPS export. You can use it to create and edit vector graphics and save them in EPS format.
2. **Gravit Designer**: Gravit Designer is a free online vector graphics editor that allows you to create and edit vector graphics. It supports EPS export, among other formats.
3. **Boxy SVG**: Boxy SVG is a web-based vector graphics editor that supports EPS export. It offers a range of features for creating and editing vector graphics.
4. **Vectr**: Vectr is a free online vector graphics editor that you can use to create and edit vector graphics. It supports EPS export, making it suitable for creating EPS files.
5. **CloudConvert**: CloudConvert is an online file conversion tool that supports converting various file formats, including PDF, SVG, and AI, to EPS format. You can upload your files and convert them to EPS online.
6. **Online-Convert**: Online-Convert is another online file conversion tool that supports EPS conversion. You can upload your files or provide a URL, and it will convert them to EPS format.
7. **Convertio**: Convertio is a web-based file conversion tool that supports converting various file formats to EPS format. You can upload your files from your computer, Dropbox, Google Drive, or URL.

These online tools provide accessible options for creating EPS files without the need for local software installation. They offer user-friendly interfaces and support various features for creating and editing vector graphics.

Submitting Files

When you are ready to upload your figure files to the journal, please choose the file type: dataset. If you do choose to upload a bitmap figure file, please choose the file type: figure. If you don't see this file type, you may need to click "Show All" on the drop-down list to see all the file types available.

The File Type called **Dataset** is used for .eps, or .svg files.

The File Type called **Figure** is used for .jpg, png, and tif.

Bitmap files are appropriate if they are photographs or very high resolution.