Example Report for Scientific Computing

The following pages illustrate an example of the style of brief report expected for the Scientific Computing course assessed exercises. We generally require a concise, clearly presented report giving the plotted data and answering the questions from the exercise.

Example Assessed Exercise: Plotting Quadratic Curves

Quadratic curves are some of the most commonly used algebraic forms, and have the general equation

$$y = ax^2 + bx + c$$

Write a program to plot the two quadratic lines with quadratic, linear and constant coefficients of 5, -3, -20, and -2, 3, 5, respectively. Adjust your plot to show the curves in the x interval -3 to 3. Use this plot to graphically determine the solutions for x when the y-values of the two curves are equal.

Use the techniques discussed in the lectures and course-book to present your plot clearly and write a very brief report, as detailed in the assessed task notes. The key issues to address are:

1. Ensure that the chart is both clear and legible, with appropriate font sizes for the axes.
2. Add appropriate axis labels.
3. Refine the range of data over which the graph is plotted, commensurate with the the purpose of the plot.
4. Give the values requested above.

Plotting Quadratic Curves

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Analysis

The plot in figure 1 shows the quadratic equations described in the assignment description. By zooming into the plot, I determined the values of x when the lines take the same y value are $\mathbf{x = -1.097}$ and $\mathbf{x = 1.954}$.

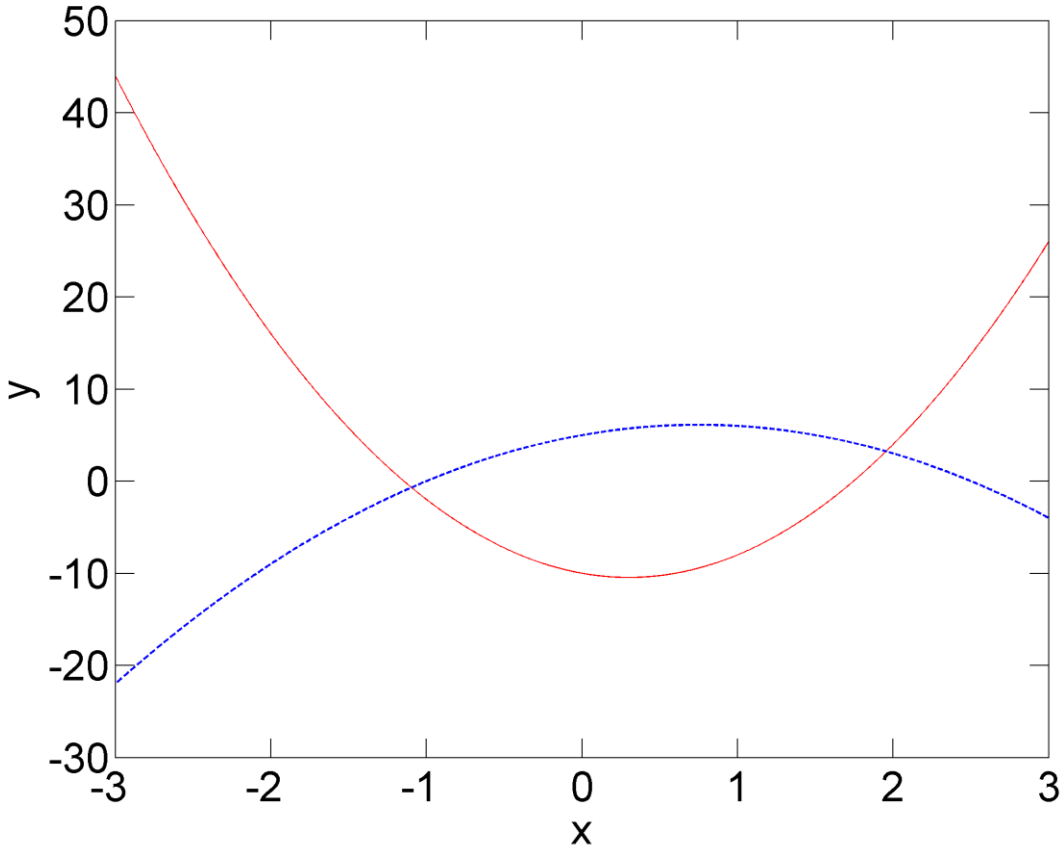

Figure 1: *Plot showing the quadratic equations with quadratic, linear and constant coefficients of 5, -3 and 10 (solid red) and -2, 3 and 5 respectively (dashed blue). The lines cross in two places.*

Appendix: MATLAB Script

```
% specify a vector of x-values for the plot
x = linspace(-3,3,1000);

% specify the coefficients and plot the first line
a = 5;
b = -3;
c = -10;
```

```
y = a*x.^2 + b*x + c;
plot(x,y,'r-','linewidth',1)

% specify the coefficients and plot the second line
a = -2;
b = 3;
c = 5;
y = a*x.^2 + b*x + c;
hold on
plot(x,y,'b--','linewidth',1)
hold off

% adjust the x-range of the plot, the axis fontsize and labels
xlim([-3 3])
xlabel('x','fontsize',20)
ylabel('y','fontsize',20)
set(gca,'fontsize',20,'ticklength',[0.02,0])

% print the figure (several formats, for convenience)
print -dmeta quadratics.emf
print -dpng -r300 quadratics.png
print -depsc2 quadratics.eps
```