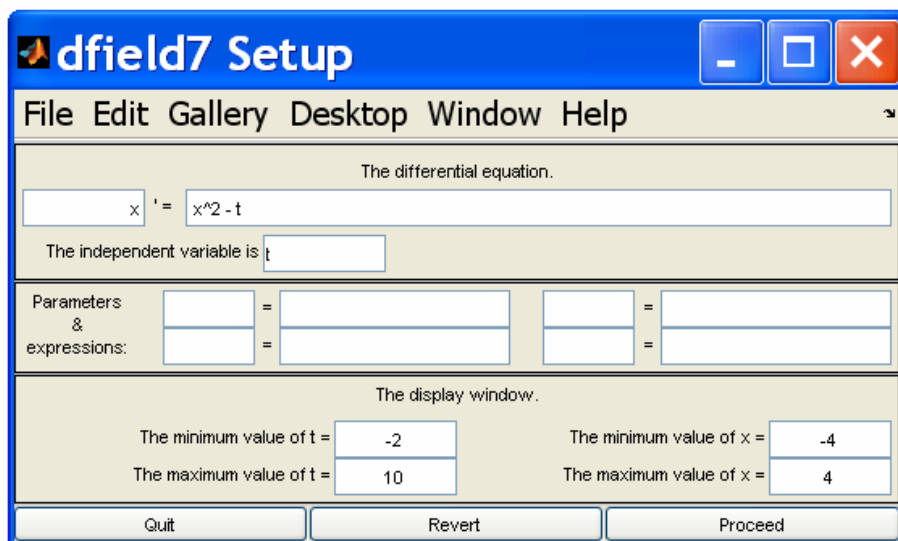


## ***dfield7***

1. From the [Useful Links](#) course web page, follow the link to the PPLANE web site (for source files). Choose the link called *For use with version 7.0 of MATLAB* and download *dfield7.m* (right-click on the link and save the file as *dfield7.m* in the MATLAB directory of your computer).
2. Then, start MATLAB and set the working directory (at the top of the MATLAB window) to the directory where you saved the file *dfield7.m*.
3. Type `dfield7` at the MATLAB prompt. The window below should appear.



4. If you click on the *Proceed* button, a new window will appear, with the slope field for the differential equation  $x' = x^2 - t$ , for  $-2 \leq t \leq 10$  and  $-4 \leq x \leq 4$ .
5. Clicking anywhere in this window will plot the solution curve going through the point that was clicked.
6. Take a few minutes to familiarize yourself with the software. Change the differential equation and the ranges for  $x$  and  $t$ . Plot a few solution curves.

**Note:** the University of Arizona has a MATLAB site license. You may download a copy for your own computer by following the instructions posted at <https://sitelicense.arizona.edu/matlab/>. You will need your NetID to download MATLAB.

## ***Plotting functions with MATLAB***

Say you want to plot the function  $f(t) = t^3 - 3t^2 + t - 7$ , for  $t$  between  $-3$  and  $8$ .

1. Define a row vector containing the values of  $t$ , say with a step of  $0.1$ . To this end, type `t = -3:0.1:8;` at the MATLAB prompt. The semicolon at the end indicates that the vector  $t$  should not be displayed on the screen.

2. Then, define a row vector containing the values of  $f(t)$ , by typing

```
f = t.^3 - 3 * t.^2 + t - 7;
```

In the above formula,  $*$  denotes multiplication,  $^$  power, and a dot ( $.$ ) before an operator means that the operation should be performed on each element of the vector  $t$ .

3. To plot the graph of  $f$  as a function of  $t$ , type

```
plot(t, f)
```

at the MATLAB prompt. To plot the graph in red, type `plot(t, f, 'r')`. Standard colors are black ( $k$ ), blue ( $b$ ), red ( $r$ ), green ( $g$ ), cyan ( $c$ ), magenta ( $m$ ), yellow ( $y$ ), and white ( $w$ ). To make the curve thicker, type for instance

```
plot(t, f, 'LineWidth', 2).
```