## HW Exercises for Section 4: Equations

*Exercise 1*. Look again at the HW exercises for Section 3, which concern studying the function $f(x) = x\, sin(x)$ graphically.

(a) Compute, either by hand or by using Maple's "diff" command, the derivative of *f*.

(b) For $x$ in the interval you used for the previous HW set, use Maple to numerically approximate several consecutive solutions of the equation $f'(x) = 0$. Show, *without doing any computation,* that these are *not* odd-integer multiples of π/2 (as they would be if we were dealing with $f(x) = sin(x)$ ).

(c) Now use Maple to show that the solutions you computed in part (b) get successively closer to odd-integer multiples of π/2. Rewrite the equation $f'(x) = 0$ as $x = g(x)$, where you find the function *g*. Then use Maple to plot the graphs $y = x$ and $y = g(x)$ on the same set of axes (start out with $x$ and $y$ restricted to the interval [-10,10], say) and use this plot to explain what is happening.

*Exercise 2*. Use Maple to verify *Cramer's Rule* for solving the system

$$a_1 x + b_1 y = c_1$$
$$a_2 x + b_2 y = c_2$$

*Exercise 3*. (a) Use "fsolve" to find a (numerical approximation to a) solution of the nonlinear system of equations

$$x^2 + y^4 = 1$$
$$cos(x) + sin(y) = 1$$

Remember to give fsolve a *set* of equations (curly brackets), not a *sequence* (no brackets) or a *list* (square brackets) of equations.

(b) Without doing any computation, find a second solution that Maple didn't notice (in the next HW set we'll use Maple's advanced plotting capabilities to see that the solutions you've found here are the *only* ones). To force fsolve to find the second solution, you can specifiy starting points for the solution algorithm. Try something like this:

```
> fsolve({eqn1,eqn2},{x=1,y=1});
```