Math 228
4-10-1994

Problem Set 30.

Problem Set 30 is due on Wednesday, April 13.

Do Problems 2, 5, 9, and 14 on page 226.

- In Problems 2 and 9, you should find a_n in terms of a_0 and a_1.
- In Problems 5 and 14, you should find a recursion formula for a_n in terms of a_{n-1} and a_{n-2}. Then you should use *Mathematica* to find a_{10} in terms of a_0 and a_1.

Here is how to use *Mathematica* to find a_{10} in terms of a_0 and a_1. Assign values to `a[0]` and `a[1]`:

```
a[0] = a0; a[1] = a1
```

Now suppose (for the sake of example) that the recursion formula is

$$a_n = \frac{(n-2)a_{n-1} - 5n^2 a_{n-2}}{n(n-1)}, \qquad n \geq 2.$$

Define a "memo function" to do the recursion:

```
a[n_] := a[n] = Expand[
    ((n - 2) a[n-1] - 5n^2 a[n-2])/(n(n - 1))]
```

Now find `a[10]`:

```
a[10]

     -4484514589 a0   412791557 a1
     -------------- + ------------
         362880          564480
```

Problem Set 31.

Problem Set 31 is due on Friday, April 15.

Do Problems 2, 6, 7, 10, and 11 on page 232.

- In Problem 10(a), you should find a_n in terms of a_0 and a_1.
- In Problem 11, you need to use the first 3 or 4 terms of the Taylor expansion for $\sin x$. Plug all the series in, multiply out, and compute a_0 through a_6 — this will give the first three nonzero terms for the two independent solutions.

Problem Set 32.

Problem Set 32 is due on Monday, April 18.

Do Problems 2, 3, 5, 10, 11, and 19 on page 437.

- In Problems 2, 3, 5, 10, and 11, you should use *Mathematica* to compute the eigenvalues and eigenvectors, and also to plot the direction field. Refer to the computer project on phase portraits to see how to do this.

"Not everything that is more difficult is more meritorious." - Saint Thomas Aquinas