222 §10.4 We're continuing our work with series with *positive* terms. This is going to be a silly beginning, but bear with me. Consider driving, on a one lane road (with no shoulder), and you can't go backwards.

(1) If you are driving behind a bus, and the bus stops, what are your options?

(2) If you are driving in front of a fire engine, and the fire engine keeps going, what are your options?

(3) If you are driving in front of a bus, and the bus stops, what are your options?

(4) If you are driving behind a fire engine, and the fire engine keeps going, what are your options?

You should have a table similar to:

If you are	Behind	In front of
Bus	Stop at or before	Anything
Fire Engine	Anything	Keep Going

Now, what does this have to do with series? Series with positive terms are like driving along the number line (our one-lane road) and never turning back. Convergent series stop (like busses) and divergent series keep going (like fire engines). (5) Following the analogy, complete this table:

If a series is	$\leq$	$\geq$
Convergent		
Divergent		

Ok, that's the setup. Now how about some basic examples? (6) How does $\sum_{n=1}^{\infty} \frac{1}{n^2+1}$ compare to $\sum_{n=1}^{\infty} \frac{1}{n^2}$? (7) Does $\sum_{n=1}^{\infty} \frac{1}{n^2}$ converge or diverge? (8) So, does $\sum_{n=1}^{\infty} \frac{1}{n^2+1}$ converge or diverge? That was pretty simple. Please note - this test (the "comparison test") doesn't tell you what it converges to. Only how it compares.

(9) To what series should you compare $\sum_{n=1}^{\infty} \frac{2}{n}$? Do so, what result does this produce?

Those are the basics. (10) What can you say about the convergence or divergence of $\sum_{n=1}^{\infty} \frac{\sin^2(2n+5)}{n^4+8n+6}$? (11) What about $\sum_{n=1}^{\infty} \frac{\ln(n+4)}{n}$?

Here's one that's a little more sophisticated: $\sum_{n=1}^{\infty} \frac{n^2+2n+10}{2n^4}$. We'll talk about it in class tomorrow - (12) what do you think now?

(13) To be clear and point to Lab 21, what can we say about either $\sum_{n=1}^{\infty} \frac{1}{n+1}$ or $\sum_{n=1}^{\infty} \frac{1}{n^2-\frac{1}{2}}$