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MATH 122B: 2/16 HW SOLUTION

1a)

n	1	2	3	4	5	6	7	...
f(n)	1	2	3	4	5	6	7	
T/F	F	T	F	T	F	T	F	...

(III)

b) (I) e.g. when $n > \sqrt{1000} = \frac{1}{\sqrt{0.001}}$

then $\left|\frac{1}{n^2}\right| = \frac{1}{n^2} < \frac{1}{1000} = 0.001$.

i.e. P holds when $n > \sqrt{0.001}$

c) (II) P only holds when

$n < \sqrt{1000} = \frac{1}{\sqrt{0.001}}$

d)

n	1	2	3	4	5	6	...
f(n)	4	5/2	2	7/4	8/5	3/2	...
T/F	T	F	T	F	F	F	...

(II)

e) (I) similar to (b): if $n > \sqrt{10^6}$

then $\frac{1}{n^2} < \frac{1}{10^6} = 0.000001$.

2). P holds for $f(n)$ as $n \to \infty$:

> There is a natural number N so that, if $n \geq N$ then P holds for $f(n)$

3) a) Lots of examples:

$f(n) = -1$ (constant)

$f(n) = -1 + \frac{1}{n}$

$f(n) = -1 - \frac{1}{2^n}$ etc.

b) Lots of examples:

P: '$|y-1| < 0.1$'

P: '$y < 1$'

P: '$y > 0$'

4) No: as soon as $n > 4$, $\frac{Pn}{7}$ is a fraction.

So, it's impossible to find N for which

$n \geq N \Rightarrow \frac{Pn}{7}$ is an integer.

5) a) F e.g P: '$y < 0.1$'
$f(n) = \frac{1}{n}$

b) F e.g P: '$y > 0$'
$f(n) = -1,000,000,000,000,000,000,100 + n$

c) T

d) F : this is nonsense.