

## Notes on “A special case of Dirichlet’s theorem”

“Papa”

*I embellished this in class on 02Oct2009. If you missed class, please get notes from a colleague.*

This refers, on our Teaching Page <http://www.math.ufl.edu/~squash/teaching.html#NumberTheory> to link “A special case of Dirichlet’s theorem”. Refer to that link for definitions of  $6N_{\text{eg}}$  and  $6P_{\text{os}}$ .

**General philosophy.** Proofs are essays, written in complete, grammatical, punctuated sentences, that make sense. Sentences start with a **word** (not a math symbol), and end with a **visible period**. (...or, occasionally, a “!” or “?!”)

**Details.** Different-case symbols are different symbols. Don’t confound “ $n$ ” with “ $N$ ”.

Underline (or boldface) words (*not* symbols) that you define.

Proofs start with “*Proof:*”, perhaps with more detail, e.g. “*Proof of (17a) in the  $N=3$  case:*”.

Break proofs into paragraphs; generally, just *one idea* per paragraph.

Write existential quantification explicitly, e.g. “*There exists...such that...*”. It is ok to use “*st.*” to abbrev “such that”. E.g. “*There exists  $\beta \in \mathbb{Z}_-$  st.  $\beta < -8$* ”. If you want to use “ $\exists$ ”, then remember to start the sentence with a *word*. E.g., “*Hence  $\exists \beta \in \mathbb{Z}_-$  st.  $\beta < -8$* ”. Now that there is a word/phrase there, we can think about replacing it with a *better* word/phrase. E.g. “*Because there are  $\infty$ ly many negative integers,  $\exists \beta \in \mathbb{Z}_-$  st.  $\beta < -8$* ”.

**Idea in proof.** We produce a pair  $N, K$  of posints, where  $N$  has *each* given  $p_j$  as a factor, and the difference,  $K - N$ , has **no** given prime as a factor.

Finally,  $K$  must have a least one  $6N_{\text{EG}}$  prime factor; this is arranged by constructing  $K$  to be  $6N_{\text{EG}}$  (and proving a lemma about the factorization of  $6N_{\text{EG}}$  numbers).

**Infelicities in Papa’s exposition.** Overuse of “works”; “works” is vague. Better: “*Proof that (4) always produces a new  $6N_{\text{EG}}$  prime*”.

**Misc.** Only use “equivalent” to mean “logically equivalent”. Otherwise, use the specific phrase that you need, e.g., “*equal*”, “*parallel*” (for lines), “*congruent mod-5*”, “*geometrically congruent*”, “*group-isomorphic*”, “*ring-isomorphic*” (or “isomorphic as rings”), “*(geometrically) similar*” (homothetic), “*equi-numerous*” (same cardinality), etc.

Avoid weasel words such as “essentially” and “basically”; this, unless you really are only giving an approximate truth, and you have *explained what* is approximate. Don’t tell me

*“Essentially,  $2 + 2$  is basically equivalent to 4.”*

Instead, write “...  $2 + 2$  **equals** 4.”

Filename: Problems/NumberTheory/dirichlet-thm.6neg-notes.  
latex

As of: Friday 02Oct2009. Typeset: 9Oct2013 at 23:30.