On the Nature of Pure Mathematics

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–Brief idea about pure mathematics–

Mathematics is one of the purest forms of science and art. It permeates every other discipline of natural sciences, engineering, etc. So, what does pure mean here or how do we perceive it would be the readers natural question. By pure we generally mean something which is unadultered. This usually carries over to the formal definition of pure in mathematics. Some consequences of this would be something which need not be pursued for the sake of its intrinsic benefit in the society or put in an another way the development of which is not fuelled by financial gain or something which need not merely turn out to finally be exploited by narrow minded individuals just for its benefits.

–Why pure mathematics?–

A few of the merits of thinking in this way is learning something for its beauty, elegance without having a utility or application in mind. It is even more farsighted and while this might seem elusive to a certain class of people. However, it is the most succinct yet unorthodox way of learning. An individual will not rely on anything for motivation other than the charm and ecstasy of delving deeper into the field.

Pure Mathematics might seem dull or practically useless. But as Bertrand Russell says; there is much pleasure to be derived from useless knowledge. Furthermore, abstract mathematics has more implications and can be applied therein. The distinction between pure and applied mathematics might seem a bit convoluted. However that is not the case.

–The distinction–

We will now discuss the distinction between pure and applied mathematics. Pure mathematics concerns entirely with study of abstract concepts regardless of how these ideas manifest or take shape and form in the real world. On the other hand applied mathematics is mathematical science and the specialized knowledge of application of the former in the real world. Thus development in applied mathematics is intimately connected and bound by further developments in pure mathematics.

–Beauty in pure mathematics

Perhaps the best way of describing pure mathematics is by thinking of it as a creative art. Its a landscape in which mathematicians immerse into and find exquisite pleasure. They know how to get inside this wonderful and remarkable world so detached from our mundane life. Our mind is the landscape and the theory, theorems, results, etc our canvas. The experience of such an ecstasy is immaculate and cannot be explained unless one experiences it.

> *Mathematics, rightly viewed, possesses not only truth, but supreme beautya beauty cold and austere, like that of sculpture, without appeal to any part of our weaker nature, without the gorgeous trappings of painting or music, yet sublimely pure, and capable of a stern perfection such as only the greatest art can*

show. The true spirit of delight, the exaltation, the sense of being more than Man, which is the touchstone of the highest excellence, is to be found in mathematics as surely as poetry. - Bertrand Russell

William Kingdon Clifford, from a lecture to the Royal Institution titled "Some of the conditions of mental development"

There is no scientific discoverer, no poet, no painter, no musician, who will not tell you that he found ready made his discovery or poem or picture that it came to him from outside, and that he did not consciously create it from within. Mathematical beauty may result from method, result, experience, philosophy. We will also consider these in particular detail.

Mathematicians might call a proof elegant if it is unusually succinct (brief) or derives from a lesser amount of additional assumptions. An interconnection or a correspondence between a theorem or other areas of mathematics which might seem unusual. If it leads to vast and deep generalizations and helps in improving his understanding of a newer concept, etc.

He might call result or a method of proof ugly or not as elegant if they use conventional or direct in approach or evolve calculations or use dependence of powerful axioms in their method of proof.

To be continued.