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Tenure Position Paper
Northwestern College
July 2006

Why Mathematics and Christianity?

He had the puzzled, wrinkled look on his face. It might have contained an aspect of skepticism as well. As a teacher, when I saw Greg slowly raise his hand for a question, I could feel the rush entering my body. He was that student who always brought something special to a class. As a bright and gifted learner, he thought several steps ahead of his peers. I knew the question I was anticipating would be insightful for the whole class and might take me by surprise as well. Would Greg's classmates appreciate his compelling question? Do they know how much he brings to the table of learning?

But before I called on him, I noticed her. Malory's eyes looked down in a glazed stare. Her left hand rubbed her brow. It was obvious this was not a blank stare. Rather, it was something she was contemplating, and something for which she wanted an answer. She was also someone very special, an exceptionally insightful student. Her questions could pierce right to the heart of an issue. I knew the class took special note when she had a question. As they had done in the past, these two students did ask the challenging questions.

I called on Malory first. She voiced those inquisitive words that have been around for centuries: "I understand this Pythagorean Theorem, *but how is it different for Christians versus non-Christians?"* When Greg sees that this left jab is going to take me some time, Greg takes his opportunity for a knockout punch: "Yeah, and *why do we have to learn this stuff anyway?"*

The answers to both of these questions have been contemplated and debated for not only centuries, but millenniums. Religious, cultural, historical, and mathematical advancements have all contributed. The pendulum has swung back and forth between viewing mathematics as a cornerstone for understanding this creation and its creator to viewing mathematics as completely void of any relationship with the liberal arts. Christians in mathematics solidify their own perspective on this dilemma as they continually study the interactions of mathematics with the knowledge humankind has been given. As an educator in a Christian liberal arts institution, I am called to a deeper understanding of both issues to respond as Russel Howell writes in *Mathematics in a Postmodern Age, A Christian Perspective:*

> We make a serious attempt to ask whether any ideas that might spring from a Christian faith commitment can enrich our understanding of mathematics, and whether the ideas of mathematics can contribute to and enlarge our understanding of the Christian faith.[1]

As we consider mathematics and our Christian faith, not only can one subject deepen the understanding of the other, but our integration of the two becomes more significant. The importance of disciplinary integration is what truly sets a Christian liberal arts institution apart. In an age where higher education is frequently criticized for losing focus and direction, a Christian perspective toward mathematics can and will help shape our understanding in many areas of life.

A Christian's view of mathematics will help bring us back to the true intent of

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[1]Russel W. Howell & W. James Bradley, *Mathematics in a Postmodern Age, A Christian Perspective* (Grand Rapids: William B. Eerdmans Publishing Company, 2001), 1.

studies based on the liberal arts. Mathematics has been and remains a foundational block in the liberal arts. Throughout history, the mastery of mathematics has helped us understand both the creation and the Creator. Such understanding is far more than mere knowledge. That is the greatest reason for the study of this discipline. This integration lends itself toward *true wisdom*, a value that seems to increasingly be lost in higher education. It is the reason George Marsden states in his book *The Outrageous Idea of Christian Scholarship*:

> Knowledge today is oriented increasingly toward the practical; at the same time, in most fields the vast increases in information render our expertise more fragmentary and detached from the larger issues of life. Although the university research ideal apparently works well enough in the sciences and technology, it is not at all clear why the same principles should be normative for the study of human society and behavior. Even the liberal arts are havens for fads that often obscure what was originally attractive about their subjects. "Wisdom" is hardly a term one thinks of in connection with such studies, nor with our system of higher education generally.[2]

To gain a fuller appreciation for the integration of Christianity and mathematics, it is imperative to consider their interaction in the past as well as the present. For centuries humankind has recognized that the creation we live in contains multiple levels of order. Throughout history most cultures and their corresponding religious beliefs affirmed the idea of a Supreme Being who created this world. This realization of a God who created a world with such profound and intricate mathematical order led to a desire to understand mathematics to the highest level possible. The desire and ultimate goal behind this endeavor was not only to understand our world, but more importantly, to understand and know its Creator.

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[2]George Marsden, *The Outrageous Idea of Christian Scholarship*(New York: Oxford University Press, 1997),1

Documented studies indicate that the Ancient Greeks hoped to take this concept to higher plateau. They felt that all creation could be reduced to *rational numbers*. Consequently, they would be able to understand this *Rational God*.[3] Whereas the overall goal and hope had some value to them, their limited knowledge of mathematics stalled the passion and progress toward this goal. Since their belief was a rational world with a Rational Creator and limited to rational numbers, there were serious hurdles ahead. Using their prized Pythagorean Theorem, they soon realized that numbers other than rational numbers appear to exist. One of the simplest examples was the hypotenuse of an isosceles right triangle whose legs measured one unit. The length of that hypotenuse could not be measured using rational numbers, yet it was obvious such a length must, in fact, exist. Where was their *Rational God* in that dilemma? Certainly, they had limited the Creator by believing that He could be contained in some type of numerical box, a very limiting box at that. Furthermore, their lack of mathematical understanding (realizing there are many other sets of numbers far more advanced than rational numbers) inhibited their understanding of this world and also their appreciation for just how awesome this Creator must be.

In spite of an apparent failure by the Greeks to fully break down and comprehend this world and its God, the Greeks did spawn the idea of a systematic analysis toward the discipline of mathematics. The Greeks are given much of the credit for the origination of the concept of logic and proof, an aspect that does interact with faith and integration of faith within a discipline.

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[3]Victor Katz, *A History of Mathematics: An Introduction.* Second edition. Addison-Wesley, 1998.

Euclid's book *The Elements* is one of the earliest documented works that systematically and logically proved some 465 propositions (theorems) from five postulates and five "common notions". The key development was not so much the body of knowledge of the 465 theorems, but rather its master structure.[4] Using the notion of proof, the Greeks began a study referred to as Euclidean Geometry, that has continued to be instrumental in mathematics to this day.

As with Euclid's proven geometry, over the course of time this method of "proven results" to describe many mathematical aspects of creation (like the sum of the degrees of a triangle sum to 180 degrees) has come under serious attack. The error frequently lies in one of the assumptions rather than the actual logic involved. Such was the case involving Euclid's fifth postulate: "Through a point (P) not on a line (*l*), there is a unique line (*m*) through (P) not intersecting (*l*)." This postulate (a self evident statement) may seem accurate, but continued analysis of the universe, and not just our world, has suggested otherwise, causing the development of non-Euclidean geometry.

Still, the method of reliance on proof and logic has been very useful and instrumental in the development of mathematics; however, its usefulness in proving the existence of God or the logic of salvation has been more limited. First, it relies on human assumptions that often reveal themselves in error or limiting. Secondly, the love of God, shown to us through salvation in Jesus Christ, is not logical. Such profound love implies a love that we cannot fathom nor prove. By God's grace we can receive and experience it, but not fully understand such a love in this life. Therefore, realizing that mathematical

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[4]Jonathon Barnes, *Early Greek Philosophy*. Penguin, 1987.

constructs are often fallible, we must bear in mind that even some of the best proofs can be unreliable in portraying universal truths.[5]

In spite of road blocks experienced by the Greeks, mathematics continued for centuries to be viewed as an important parallel track of study with religion. From the emergence of the Islamic culture to the time of the Middle Ages, religion and mathematics were key foundational subjects for the liberal arts, including theology. A strong mastery in one of the subjects improved the understanding of the other.

In the early 1600s, this pattern of religion and mathematics traveling on parallel tracks took a major turn. Galileo, a man with very strong religious convictions, began making his works public (works that had grown from the discoveries of Copernicus) concerning a radical theory of the planets revolving around the sun. Despite Galileo's well-known statement: "God wrote the universe in the language of mathematics," the established church of that time took a strong position against Galileo's notion of the sun being the center of our solar system rather than the earth. Galileo's stance was in contrast to the belief that humankind was the center and pivotal part of God's creation. The church supported its position with verses such as Psalm 113:3: "From the rising of the sun to the place where it sets, the name of the Lord is to be praised," and Ecclesiastes 1:5: "The sun rises and the sun sets, and hurries back to where it rises." Another verse cited was Psalm 93:1: "The world is firmly established; it cannot be moved." Even though the church's interpretation of those verses was taken out of context, nevertheless the

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[5]Paul Ernest, *Social Constructivism as a Philosophy of Mathematics* (SUNY Press, 1998).

church's firm stand ignited a dividing fire that would burn strong to this day. That fire produced a division between science and religion. The church's response was ordering persecution for all who supported what church leaders believed to be a critical heresy. The ensuing result was an atmosphere of suspicion and mistrust.

This atmosphere caused a division between mathematical development and faith in a God of order. Most of the lay people stood behind the church's position until the accuracy of Copernicus, Galileo, and others became obvious enough that the church had to resign its position. The masses began to lose confidence in the church as an ultimate authority. This was a pivotal time in determining how the disciplines of mathematics and science would be integrated with faith.[6]

The irony of this period was that most of the scientists had strong religious beliefs. Individually, they did not see their advancements in mathematics as any type of threat to the faith taught by the established church. "Several of the early scientists were at odds with ecclesiastic politics while holding fervently to personal religious beliefs."[6] Galileo would certainly be one of the most noteworthy. There is also evidence to indicate that many individuals within the church, who were removed from the hierarchy, were actually in support of men such as Copernicus and Galileo.

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[6]Nancy R. Pearcey & Charles B. Thaxton, *The Soul of Science; Christian Faith and Natural Philosophy*, Crossway Books, 1994, p 38.

From the time of Galileo to the present, a significant portion of the intellectual community has placed an increased confidence in mathematics and the sciences over faith[7]. "The notion that mathematics and religious thought belong to different realms having little or nothing in common has gained considerable credibility."[8] I do not believe this was the intent of our God.

In the postmodern era, that same separation between mathematical and religious thought seems to be more intentional. In our present era of global and international interaction, one reason for the intentional separation may be improved credibility for the cutting edge of mathematical thought. Mathematical developments gain global acceptance more easily when they are not tied to a particular culture or religious faith.

Another possible reason for the deliberate attempt at separating mathematics and faith may stem back to Euclid and his notion of proof. Mathematical development has gained credibility when it was accompanied by its demanded proof, making clear and precise what we find in creation.[9] However, faith does not demand or desire any such proof. Rather we read in Hebrews 11:1: "Faith is being sure of what we hope for and certain of what we do not see." This definition of faith is void of any notion of proof connected to our physical world. It is the kind of faith that pleases God and produces

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[7]Dorothy Stimson, *The Gradual Acceptance of the Copernican Theory of the Universe*, (Library of Congress Citations) <www.mala.bc.ca/~mcneil/cit/citlccopern1.htm Accessed 15 June 2006.

[8]Russel W. Howell & W. James Bradley, *Mathematics in a Postmodern Age, A Christian Perspective* Grand Rapids: William B. Eerdmans Publishing Company, 2001, 2.

[9]William Alston, David Holwerda, George Marsden, George Mavrodes, Alvin Plantinga, and Nicholas Wolterstorff, *Faith and Rationality: Reason and Belief in God*, University of Notre Dame Press, 1983.

its own righteousness. It is an integral part of education. However, it needs to be taught as a higher level of spiritual understanding when what we can rationalize or prove displays itself to be limiting. George M. Marsden does not indicate such a rise on the spiritual ladder:

> Any personal beliefs—religious or otherwise—that are discussed in the classroom have to be supported by evidence, and that evidence should meet the standards of the profession. But faith is, by definition, a belief in that for which there is no proof: once a belief can be supported by independent, scientific evidence, it loses its religious nature. . . . when considering any theory, " the evidence has to carry the day, not the fact that it is Christian.[10]

I firmly believe mathematics and Christianity *are* to be integrated and that the understanding of one will deepen and strengthen the understanding of the other. However, it is necessary to be reminded that we are a fallen people living in a fallen creation. That state of being results in frequent errors and misinterpretations of both God's general revelation and His special revelation. While these misinterpretations occur in many disciplines, one can easily find times when such a misinterpretation in mathematics could lead to errors in our faith. Likewise, misinterpreting scripture can lead to errors in our understanding of mathematics.

A critical concept that we have been traversing over instead of traveling through is what Pilate asked Jesus in John 18:38: "What is truth?" Deceptive answers to that question started in the Garden of Eden and continue to affect both mathematics and faith. Mathematics has often been thought of as pure truth and has at times been worshipped as the ultimate truth. However, history has shown that errors in our understanding of

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[10]George Marsden, *The Outrageous Idea of Christian Scholarship*(New York: Oxford University Press, 1997), p25.

mathematics still leave doubt about absolute truth or ultimate truth.

The Holy Scriptures have much to say about the subject of truth. There are numerous passages that speak about what truth is and how to attain it, but none is more direct and profound than John 14:6. Jesus said, "I am the way and the truth and the life." Here, the truth of God provides us with direction as it relates to sin and salvation. However, truth interacts with many aspects of life in this world; also truth affects humankind's interaction with creation. If we are to truly understand a world created by a Triune God, what better way to achieve that understanding than through the very direction and given insight from the One who has created that world? Psalm 25:5 tells us the best way to look at *every* area of life, "guide me in your truth and teach me".

So as we consider truth as it pertains to our world, in spite of humanity's fallen state, the discipline of mathematics and faith can and do work together. Fortunately, not all mathematicians and scientists see themselves and their mathematical work as contrary to religion and faith. Many believe that the more we understand our world, the more obviously it points to its Creator. "The scientists who developed classical physics were mostly Christians seeking to make sense of the way God interacts with His creation—the way He gives order and coherence to the natural world."[11] Thankfully, this attitude is still alive and well for many scientists and mathematicians.

That same perspective from some of today's mathematicians has shed both light and darkness on what we can interpret from what we see and are able to mathematically

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[11]Nancy R. Pearcey & Charles B. Thaxton, *The Soul of Science; Christian Faith and Natural Philosophy*, Crossway Books, 1994. p79.

prove. Darkness settles in when we realize humanity has not been able to explain everything seen or experienced on this earth. Light enters in when faith is considered not as an escape to an unexplainable problem, but rather a building block and cornerstone to a more in depth and overall understanding of creation. As George Marsden states:

> The distinguishing feature of Christian scholars working in mainstream academic settings is not that they are going to identify the workings of the Holy Spirit in the Great Awakening or use God to explain any gaps in current scientific theory, but rather they do not believe that empirically demonstrable explanations are the only, or even the most important, explanation. This openness sets their other calculations and theories in a different context and hence subtly changes their implications and relative importance. No matter how wonderful our scientific explanations of the working of the cosmos, we should not stumble into the unfounded conclusion that the physical cosmos is all there is.[12]

Indeed, even in this century, philosophical theories from the origin of the human race to the order found in intricate snowflakes continues to point toward a Divine Being. The once widely accepted theory of evolution as the *origin* of life has lost some credibility by the realization from the scientific community itself that the interactions of multiple systems of increasingly advanced forms of life on this planet could not have existed independently of one another. They had to all exist simultaneously or they would not have survived. The best explanation the non-Christian scientists have produced is a "Big Bang Theory". The creationists see this interaction of systems and their interdependence as just another indication or piece of evidence of the existence of a Divine Being who actually created this universe.[13]

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[12]George Marsden, *The Outrageous Idea of Christian Scholarship*(New York: Oxford University Press, 1997), p74.

[13]William B. Eerdmans, *Portraits of Creation: Biblical and Scientific Perspectives on the World's Formation*, Grand Rapids, 1990.

A true materialist would look at a snowflake and say its design is just evidence that order is self-creating. Christians see the same flake and see God's signature on each one. Some mathematicians look at the discovery of the multiple sets of numbers as evidence of humanity's continued intellectual development. A Christian mathematician sees these developments as gifts from God. They are gifts to help our society function better, but more importantly, gifts to help us see the divine order in this creation and ultimately point us toward its Creator. The humanistic historian looks at a historical account of an Israelite nation as portrayed in the Bible as having some credibility because many of the names and dates can be verified in historical records from other countries. The Christian historian sees the same account as having a divine plan, purpose, and order. The Christian sees the plan of salvation interwoven throughout the account. The Christian reads the account in Matthew 1 and recognizes the depth of the phrase "in the fullness of time." The atheistic actuary could use multiple types of statistical distributions and learn the ability to accurately calculate risk and make a business profitable. Christian actuaries not only see the application possibilities for business and financial investments, but they would see that what was viewed for centuries as random chaos actually has an order that displays a profound Creator behind all of it. They would realize God places order even in what mankind calls chaos.

Mathematics is not just a neutral tool that can be used for good or bad in this creation. Rather, and more importantly, people's ability to understand mathematics was given to point them to their Creator. The following verse has been a foundational block for my own understanding of why disciplines such as mathematics need to be integrated with faith. Romans 1:20 says, "For since the creation of the world God's invisible

qualities—his eternal power and divine nature—have been clearly seen, being understood from what has been made, so that men are without excuse." This verse clearly indicates to me the importance of scripture helping us see the purpose and usefulness of mathematics as well as the mastering of mathematics helping us understand an awesome God.

That divine nature of God spoken about in Romans 1 has numerous characteristics, some of which he shares with us and some that are reserved for him alone. He shares with us (or helps us acquire) characteristics such as love, faithfulness, holiness, goodness, patience, and many others. He reserves some, such as omniscience, omnipotence, and omnipresence for himself. To be certain, understanding each of these characteristics about our God makes us more faithful children in his family. Such understanding makes us interact with Him in a closer and more intimate way.

For example, when we understand God's holiness we then realize the necessity for the separation displayed from our original sin in the garden as well as every time we continue to sin in this life. Understanding God's justice helps us more fully appreciate the incredible price demanded on Calvary. Seeing the gift of Emmanuel helps us understand the Father's unfathomable love and how in that night the soul did finally feel and know its true worth. The more we understand the characteristics of God and who God really is, the more we will become what each of us was created to be. One of God's characteristics is His *order*. That is very evident when viewing and analyzing creation as well as reading His Word. There is a level of order and pattern to all He has shown us, both in His special and general revelation. That order continues to be revealed to us in His time and for His purpose. Therefore, understanding that characteristic of order to

increasing levels will continue to give us a more awe-inspiring realization of just how wonderful a God we serve. It can help us be more patient when waiting on God's sovereignty because we realize God will complete his work "in the fullness of time." Knowing the vast number of all our sins helps us realize the incredible price for *each one* we commit. Each one (even though we cannot count them all) had to be paid for on Calvary. God has displayed His order and divine nature for a purpose. He wants us to know him more fully. Two thousand years ago Euclid realized this connection and is well known for his quote: "The laws of nature are but mathematical thoughts of God."

I believe the integration of faith and mathematics clearly ties in with many of Northwestern's learning goals as stated in *A Vision for Learning*. To highlight just a few that apply to this paper:

We intend Northwestern graduates to be persons who

Trust, Love, and Worship God

- Understanding that God is the center of life, learning about God through careful and rigorous study, and aspiring to trust, love, and worship God as the sovereign Lord of the universe.
- Pursuing truth faithfully in all aspects of life; developing, articulating, and supporting their own beliefs.
- Desiring to continue a life of learning and contemplation.
- Exhibiting a broad understanding of the current and historical interplay of different realms of knowledge and experience.
- Seeing beauty and finding joy in all pursuit
- Discerning and developing their unique gifts in service to Christ, the church, and the world Christ loves and redeems.

How do we answer Malory's question: "How is this Pythagorean Theorem different for Christians versus non-Christians?" and Greg's question: "Why do we need to learn this stuff anyway?" My answer at this present time in the journey God is leading me: Every mathematical thought we have been given the ability to think, every mathematical theorem or law that has been discovered and proved, every amazing

awareness of just how many increasing levels of order we find in this creation are all designed and planned by God for two purposes. The first and most important purpose is to point us to God and draw us to a closer and more meaningful fellowship with Him. The second purpose is for us to use these mathematical abilities and insights as we strive to redeem all of creation.