

# MATH 330 — Spring 2011

## ASSIGNMENT 6

Due February 16, 2011

6.1. *Journey Through Genius* has brought us to a variety of geographic locations.<sup>1</sup>

Find a map of the Earth of recent vintage (online, black & white, line drawing). Make sure that it is large and not more than 25 years old. You want a high quality image if you print it in landscape mode on  $8\frac{1}{2} \times 11$  paper. Label the following locations, all of which have played a role in our readings so far.

- Egypt, including Alexandria (discussed throughout *Journey Through Genius*)
- Mesopotamia (discussed in Chapter 1 of *Journey Through Genius*)
- Greece, including Athens (discussed throughout)
- Samarkand, the old city that was the center of Islamic learning in the 1100-1200's
- Iraq, including Baghdad (discussed on page 130 of *Journey Through Genius*)
- Turkey (the birthplace of Thabit ibn Qorra, discussed on page 130 of *Journey Through Genius*)
- India, specifically the Indus River Valley (source of Hindu-Arabic numerals, discussed on page 130 of *Journey Through Genius*)
- Spain, including the city of Toledo (discussed on page 131 of *Journey Through Genius*)
- Italy (discussed in Chapter 6 of *Journey Through Genius*)

6.2. In Chapter 6 of *Journey Through Genius*, a derivation of the quadratic formula is given on page 148 by the method of “depressing” the general quadratic function to a quadratic with no linear term. This is different from the proof obtained by the method of “completing the square,” which is often found in high school mathematics textbooks.

- (a) Provide a derivation of the quadratic formula by completing the square.
- (b) Provide a geometric interpretation of completing the square.
- (c) Which derivation do you prefer and why?

If this is unfamiliar/forgotten, you might consult the *Wikipedia* article titled “Completing the square.”

<sup>1</sup>The following is an excerpt from a National Geographic press release from May 2, 2006; for the full report, go to <http://www.nationalgeographic.com/roper2006/>.

Despite the barrage of news coverage about the Iraq war since it began in 2003, six in 10 young Americans ages 18 to 24 cannot find Iraq on a map of the Middle East, according to a new National Geographic-Roper Public Affairs 2006 Geographic Literacy Study. Two-thirds do not know that the catastrophic October 2005 earthquake that killed 70,000 people struck in Pakistan. More than four in 10 can't even place Pakistan in Asia.

According to the survey, conducted in December 2005/January 2006, young Americans are alarmingly ignorant of the relationships between places that give context to world events. Seventy-four percent believe English is the primary language spoken by the most people in the world; it is Mandarin Chinese. Seventy-one percent don't know that the United States is the largest exporter of goods and services; nearly half (48 percent) think it is China. And while China's population is actually four times the size of the U.S. population, 45 percent of young Americans think it's only twice as large. Though outsourcing of jobs to India has been a major business news story, almost half the respondents (47 percent) were not able to find that country on a map of Asia.

Respondents also demonstrated poor understanding of global hotspots. Seventy-five percent couldn't locate Israel on a map of the Middle East, despite the fact that the conflict between Israelis and Palestinians has been ongoing throughout these young people's lives. Seven in 10 couldn't find North Korea on a map of Asia, and six in 10 did not know its border with South Korea is the most heavily fortified in the world. Thirty percent thought the most heavily fortified was the U.S.-Mexican border.