**Name:** *Caleb McWhorter — Solutions* **Fall 2014**
**MAT 221: Section 1** **Quiz 5**

**Note:** *You must show the details of the work to receive credit. Simply providing the final answer [from a calculator] will get **ZERO** points.*

**Formulae**:

(i) $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

(ii) If $P(B) > 0$, then $P(A|B) = \dfrac{P(A \text{ and } B)}{P(B)}$.

A survey of middle school students asked: "What is your favorite winter sport?" The proportion of the students who chose each sport by their grade levels are given below:[1]

Favorite Winter Sport

| | Snowboarding | Skiing | Ice Skating |
|---|---|---|---|
| Grade 6 | 0.13 | 0.08 | 0.16 |
| Grade 7 | 0.15 | 0.15 | 0.40 |
| Grade 8 | 0.12 | 0.07 | 0.10 |

A student from this survey is selected at random. [Each of the following problems is worth 3 points, and do not forget the problems on the back!]

1. What is the probability of selecting a student whose favorite sport is skiing?

$$P(\textit{skiing}) = 0.08 + 0.15 + 0.07 = 0.30$$

2. What is the probability of selecting a student who is in 7th grade or whose favorite winter sport is skiing?

$$P(\textit{7th grade or skiing}) = 0.15 + 0.15 + 0.40 + 0.08 + 0.07 = 0.85$$

[1] Based on question from Oswego City School District Regents Exam Prep Center (regentsprep.org/regents/math/algebra)

3. If the student selected is a 7th grade student, what is the probability that the student prefers ice-skating?

$$P(\textit{skating} \mid \textit{7th grade}) = \frac{0.40}{0.15 + 0.15 + 0.40} = \frac{0.40}{0.70} = 0.5714$$

4. If the student selected prefers snowboarding, what is the probability that the student is a 6th grade student?

$$P(\textit{6th grade} \mid \textit{snowboarding}) = \frac{0.13}{0.13 + 0.15 + 0.12} = \frac{0.13}{0.40} = 0.3250$$

5. If the student selected is an 8th grade student, what is the probability that the student prefers skiing or ice-skating?

$$P(\textit{skiing or skating} \mid \textit{8th grade}) = \frac{0.07 + 0.10}{0.12 + 0.07 + 0.10} = \frac{0.17}{0.29} = 0.5862$$