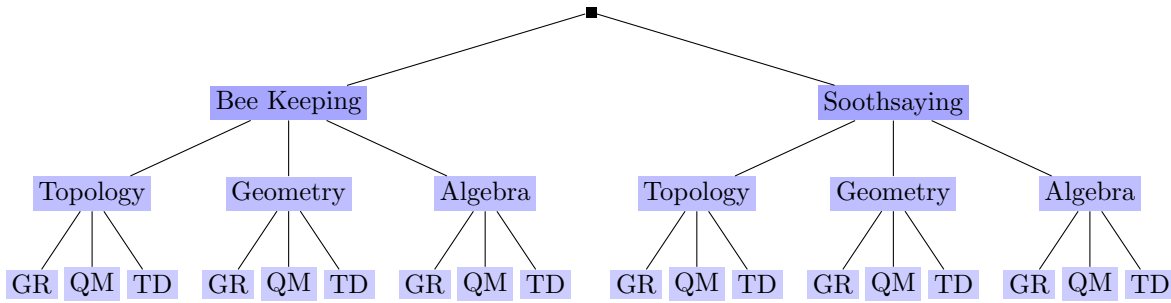


MATH 101 EXAM #3 KEY (SUMMER 2011)

1a.



1b.  $\frac{3}{18} = \frac{1}{6} \approx 0.167$

1c.  $\frac{5}{18} \approx 0.278$

2.  $\frac{16}{52} = \frac{4}{13} \approx 0.308$

3a.  $\frac{4}{52} \cdot \frac{4}{52} = \frac{1}{13} \cdot \frac{1}{13} = \frac{1}{169} \approx 0.0059$

3b.  $\frac{4}{52} \cdot \frac{4}{51} = \frac{1}{13} \cdot \frac{4}{51} = \frac{4}{663} \approx 0.0060$

4.  $\frac{3}{4} \cdot \frac{3}{4} \cdot \frac{1}{4} \cdot \frac{1}{4} \cdot \frac{3}{4} \cdot \frac{3}{4} = \frac{81}{4096} \approx 0.020$

5a.  $P(0-60 | \text{male}) = \frac{41}{171} \approx 0.240$

5b.  $P(\text{female} | \text{over } 120) = \frac{14}{35} = \frac{2}{5} \approx 0.400$

5c.  $P(61-120 \text{ or over } 120 | \text{male}) = P(61-120 | \text{male}) + P(\text{over } 120 | \text{male}) = \frac{109}{171} + \frac{21}{171} = \frac{130}{171} \approx 0.760$

6a.  $26 \cdot 25 \cdot 24 \cdot 23 \cdot 10 \cdot 9 = 32,292,000$

6b.  $26^4 \cdot 10^2 = 45,697,600$

7.  $3^8 = 6,561$

8.  $\frac{11!}{(2!)(3!)} = 3,326,400$

9.  ${}_{28}C_{22} = 376,740$

10.  ${}_{18}C_6 \cdot {}_{12}C_4 \cdot {}_8C_2 = 18,564 \cdot 495 \cdot 28 = 257,297,040$

11.  $\frac{{}_8C_3}{{}_{12}C_3} = \frac{56}{220} = \frac{14}{55} \approx 0.255$

12a.  $\frac{{}_2C_2}{{}_7C_2} = \frac{1}{21} \approx 0.048$

12b.  $P(\text{at least 1 car}) = P(1 \text{ car or } 2 \text{ cars}) = P(1 \text{ car}) + P(2 \text{ cars}) = \frac{{}_2C_1 \cdot {}_5C_1}{{}_7C_2} + \frac{{}_2C_2}{{}_7C_2} = \frac{10}{21} + \frac{1}{21} = \frac{11}{21} \approx 0.524$

$$13. \frac{{}_4C_2 \cdot {}_4C_2 \cdot {}_{44}C_1}{{}_{52}C_5} = \frac{(6)(6)(44)}{2,598,960} = \frac{1,584}{2,598,960} = \frac{33}{54,145} \approx 0.000609$$

$$14. P(2) = ({}_{12}C_2)(0.004)^2(0.996)^{10} = 66(0.004)^2(0.996)^{10} \approx 0.00101$$

$$15a. P(5) = ({}_{10}C_5) \left(\frac{1}{5}\right)^5 \left(\frac{4}{5}\right)^5 = 252(0.2)^5(0.8)^5 \approx 0.0264$$

$$15b. P(9) + P(10) = ({}_{10}C_9) \left(\frac{1}{5}\right)^9 \left(\frac{4}{5}\right)^1 + ({}_{10}C_{10}) \left(\frac{1}{5}\right)^{10} \left(\frac{4}{5}\right)^0 = 10 \left(\frac{1}{5}\right)^9 \left(\frac{4}{5}\right) + \left(\frac{1}{5}\right)^{10} = 4.1984 \times 10^{-6}$$

$$15c. P(\geq 1) = 1 - P(0) = 1 - ({}_{10}C_0) \left(\frac{1}{5}\right)^0 \left(\frac{4}{5}\right)^{10} = 1 - \left(\frac{4}{5}\right)^{10} \approx 1 - 0.107 \approx 0.893$$