Math 365 Partial solutions to Exam 2 (white version)

2. (a) No. Counterexample: $x = 0$, $y = 1$ and $z = 2$. Then $xy = xz$, but $y \neq z$.
(b) If $y = z$, then $xy = xz$. Yes, it's true.

3. (a) 6. (Since a must correspond to 4, there are 3 possibilities left for b to correspond to. Once that is chosen, there are 2 possibilities left for c to correspond to. Once that is chosen, the number corresponding to d is simply the one that is left. So there are $3 \cdot 2 \cdot 1 = 6$ correspondences.)
(b) 4. (There are 2 possibilities for a to correspond to. Once that is chosen, there is only 1 left for b. There are two possibilities for c to correspond to, and once that is chosen, there is only 1 left for d. So the answer is $2 \cdot 1 \cdot 2 \cdot 1 = 4$.)

4. Using the equation

$$n(B \cup F \cup S) = n(B) + n(F) + n(S) - n(B \cap F) - n(B \cap S) - n(F \cap S) + n(B \cap F \cap S),$$

we have $86 = 52 + 33 + 23 - 12 - 3 - n(B \cap S) + 2$, so that $n(B \cap S) = 9$.

5. $s + n = 61$, $4s + 6n = 266$, solve to get $s = 50$

6. Using the equation $a_n = a_1 + d(n-1)$, since $a_4 = 1$ and $a_{10} = -17$, we have $1 = a_1 + 3d$ and $-17 = a_1 + 9d$. Solve to get $d = -3$ and $a_1 = 10$. Then $a_2 = 7$.

7. (a) A, C, D (b) No.

8. T, F, T, T, F

Math 365 Partial solutions to Exam 2 (yellow version)

2. (a) No. Counterexample: $a = 0$, $b = 1$ and $c = 2$. Then $ab = ac$, but $b \neq c$.
(b) If $b = c$, then $ab = ac$. Yes, it's true.

3. (a) 6. (Since d must correspond to 1, there are 3 possibilities left for a to correspond to. Once that is chosen, there are 2 possibilities left for b to correspond to. Once that is chosen, the number corresponding to c is simply the one that is left. So there are $3 \cdot 2 \cdot 1 = 6$ correspondences.)
(b) 4. (There are 2 possibilities for a to correspond to. Once that is chosen, there is only 1 left for c. There are two possibilities for b to correspond to, and once that is chosen, there is only 1 left for d. So the answer is $2 \cdot 1 \cdot 2 \cdot 1 = 4$.)

4. Using the equation

$$n(B \cup F \cup S) = n(B) + n(F) + n(S) - n(B \cap F) - n(B \cap S) - n(F \cap S) + n(B \cap F \cap S),$$

we have $91 = 52 + 33 + 23 - 12 - 3 - n(B \cap S) + 2$, so that $n(B \cap S) = 4$.

5. $s + n = 57$, $3s + 5n = 205$, solve to get $s = 40$

6. Using the equation $a_n = a_1 + d(n-1)$, since $a_5 = 4$ and $a_{11} = -8$, we have $4 = a_1 + 4d$ and $-8 = a_1 + 10d$. Solve to get $d = -2$ and $a_1 = 12$. Then $a_2 = 10$.

7. (a) B, D (b) No.

8. F, T, F, T, F