Math 483 Quiz 2 Spring 2005 2015 Name___________________

age	female	male	total
young 18-39	444	452	896
middle aged 40-59	376	362	738
old 60 and up	263	194	457
total	1083	1008	2091

compute

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1) The table above is based on the 2000 census for US adults. There are slightly more young men than young women, but many more old women than old men.

a) Find the probability P(male ∩ young) that a randomly person from the table population is young and male.

$$\boxed{\frac{452}{2091} = 0.2162}$$

b) Find the probability P(male|young) that the adult is male given that the adult is young.

$$\frac{452/2091}{896/2091} = \boxed{\frac{452}{896} = .5045}$$

c) Are the events "male" and "young" independent? Explain briefly.

wrong work -4

no #'s -1

No $P(\text{male}|\text{Young}) = .5045 \neq P(\text{male}) = \frac{1008}{2091} = .4821$

or $P(\text{male} \cap \text{Young}) = .2162 \neq P(\text{male})P(\text{Young}) = \frac{1009}{2091}\frac{896}{2091} = .2066$ (.482, .429)

10 → 2) A diagnostic test for AIDS has probability 0.005 of producing a false positive (incorrectly stating that a person who does not have the AIDS virus is in fact infected). Suppose that 100 healthy people are tested for the AIDS virus and that the tests are independent. What is the probability that at least one false positive will occur? DO NOT SIMPLIFY THE APPROPRIATE SYMBOL(S).

$P(\text{at least one}) = 1 - P(\text{none}) = \boxed{1-(.995)^{100}} \approx .394 = 1 - P(x=0)$

$= 1 - \binom{100}{0}(.005)^0(.995)^{100}$ where x counts # of false positives in 100 trials

10 e 3) Suppose that $P(A) = 0.7$, $P(B) = 0.6$ and $P(A \cup B) = 0.9$. Find $P(A \cap B)$.

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

So $P(A \cap B) = P(A) + P(B) - P(A \cup B) = .7 + .6 - .9 = \boxed{0.4}$

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4) Suppose P(A) = 0.6 and P(B) = 0.3.

a) Find P(A ∪ B) if events A and B are independent.

$P(A)+P(B) - P(A)P(B) = .6+.3 - .6(.3) = \boxed{.72}$

b) Find P(A ∪ B) if events A and B are disjoint (mutually exclusive).

$.6+.3 = \boxed{.9}$

y	2	3	4	5	6
p(y)	0.42	0.32	0.15	0.06	0.05

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5) Let the discrete random variable Y be the number of years a randomly selected SIU alumni took to graduate if the alumni was a transfer student in 1993 who graduated in six or fewer years after transferring. The table above displays the approximate probability distribution of Y.

a) Find $E(Y)$. $= \sum y\, p(y) =$

$2(.42) + 3(.32) + 4(.15) + 5(.06) + 6(.05) = \boxed{3.00}$

b) Find $E(Y^2)$. $= \sum y^2\, p(y)$

$= 2^2(.42) + 3^2(.32) + 4^2(.15) + 5^2(.06) + 6^2(.05) = \boxed{10.26}$

c) Find the standard deviation of Y.

$\sqrt{V(Y)} = \sqrt{E(Y^2) - (E(Y))^2} = \sqrt{10.26 - (3.0)^2} = \sqrt{1.26} = \boxed{1.1225}$

y	$(y-\mu)^2\, p(y)$
2	.42
3	0.00
4	.15
5	.24
6	.45
	1.26