Unit 7 Review:
Part I – Multiple Choice

1) The following are the probability distributions for two random variables, X and Y:

X	$P(X=x)$
3	$\frac{1}{3}$
5	$\frac{1}{2}$
7	$\frac{1}{6}$

Y	$P(Y=y)$
1	$\frac{1}{8}$
3	$\frac{3}{8}$
4	?
5	$\frac{3}{16}$

If X and Y are independent, what is $P(X=5 \text{ and } Y=4)$?

(a) $\dfrac{5}{16}$

(b) $\dfrac{13}{16}$

(c) $\dfrac{5}{32}$

(d) $\dfrac{3}{32}$

(e) $\dfrac{3}{16}$

2) The probability function, $g(x) = 0.02x$ is defined for $x = 8, 9, 10, 11$, and 12. What is the mean of this probability distribution?

A. 10
B. 10.2
C. 20
D. 50
E. This is not a probability distribution.

3) As a payment for helping at home, you have been given a choice of either a flat payment of $5, or a chance of randomly drawing a bill from a box. The box contains one $100 bill, two $20 bills, seven $10 bills, ten $5 bills, and thirty $1 bills. Which choice gives you the greatest expected payment?

A. Flat payment because the expected value of selecting a bill from the box is less than $5.
B. Flat payment because the expected value of selecting a bill from the box is equal to $5, and it is better to have a sure thing.
C. Draw from the box because the expected value of selecting a bill from the box is greater than $5.
D. Draw from the box because the expected value of selecting a bill from the box is equal to $5, so you have nothing to lose.
E. Flat payment because the expected value of selecting from the box cannot be determined.

4) In a company-sponsored contest, the chance of wining various amounts of money is given here:

Prize ($)	500	100	50	1	0
Win Probability	0.01	0.03	0.11	0.50	0.35

What is the expected value and standard deviation of the prize?

A. 130.2, 14
B. 14, 53.66
C. 53.66, 130.2
D. 14, 42.42
E. 53.66, 14

5) Which of the following events are true?

I. The standard deviation of a random variable is always positive.
II. The variance of a random variable is always greater than the standard deviation.
III. The law of large numbers implies that as a probability experiment is repeated, the variance will approach zero.

A. I only
B. II only
C. I and II
D. II and III
E. None of the above statements is true.

6) It turns out that 25 seniors at Fashionable High School took both the AP Statistics exam and the AP Spanish Language exam. The mean score on the Statistics exam for the 25 seniors was 2.4 with a standard deviation of 0.6 and the mean score on the Spanish Language exam was 2.65 with a standard deviation of 0.55. We want to combine the scores into a single score. What are the correct mean and standard deviation of the combined scores?

(a) 5.05; 1.15
(b) 5.05; 1.07
(c) 5.05; 0.66
(d) 5.05; 0.81
(e) 5.05; you cannot determine the standard deviation from this information.

1) . In the casino game of roulette, a ball is rolled around the rim of a circular bowl while a wheel containing 38 slots into which the ball can drop is spun in the opposite direction from the rolling ball; 18 of the slots are red, 18 are black, and 2 are green. A player bets a set amount, say $1, and wins $1 (and keeps her $1 bet) if the ball falls into the color slot the player has wagered on. Assume a player decides to bet that the ball will fall into one of the red slots.

(a) What is the probability that the player will win?
(b) What is the expected return on a single bet of $1 on red?

2) . Half Moon Bay, California, has an annual pumpkin festival at Halloween. A prime attraction to this festival is a "largest pumpkin" contest. Suppose that the weights of these giant pumpkins are approximately normally distributed with a mean of 125 pounds and a standard deviation of 18 pounds. Farmer Harv brings a pumpkin that is at the 90% percentile of all the pumpkins in the contest. What is the approximate weight of Harv's pumpkin?

3) . A random variable X is normally distributed with mean μ, and standard deviation σ (that is, X has $N(\mu,\sigma)$). What is the probability that a term selected at random from this population will be more than 2.5 standard deviations from the mean?

4) Consider a random variable X with $\mu_X = 3$, $\sigma_X^2 = 0.25$. Find

    (a) μ_{3+6X}

    (b) σ_{3+6X}

5) A random variable M has a mean of 12 and a standard deviation of 3. If each value of M is multiplied by 4 and then 6 is added to the result, what will be the new mean and standard deviation?

6). The normal random variable X has a standard deviation of 12. We also know that $P(x > 50) = 0.90$. Find the mean μ of the distribution.

7) A normal distribution has mean 700 and standard deviation 50. The probability is 0.6 that a randomly selected term from this distribution is above x. What is x?

① Considered a probability density curve defined by the PDF function $y = |x-1|$ on the interval $[0,2]$. Find $p(.5 \leq x \leq 1.5)$