Review for Exam 2

1. The *p.m.f.* of a finite random variable *Y* is given below.

y	1	2	5	10
$f_Y(y)$	0.2	0.4	0.3	0.1

   (a) Find $P(Y = 5)$.
   (b) Find $P(1 \leq Y \leq 5)$.
   (c) Find μ_Y.
   (d) Find σ_Y.

   A random sample of eight observations of *Y* is given below.

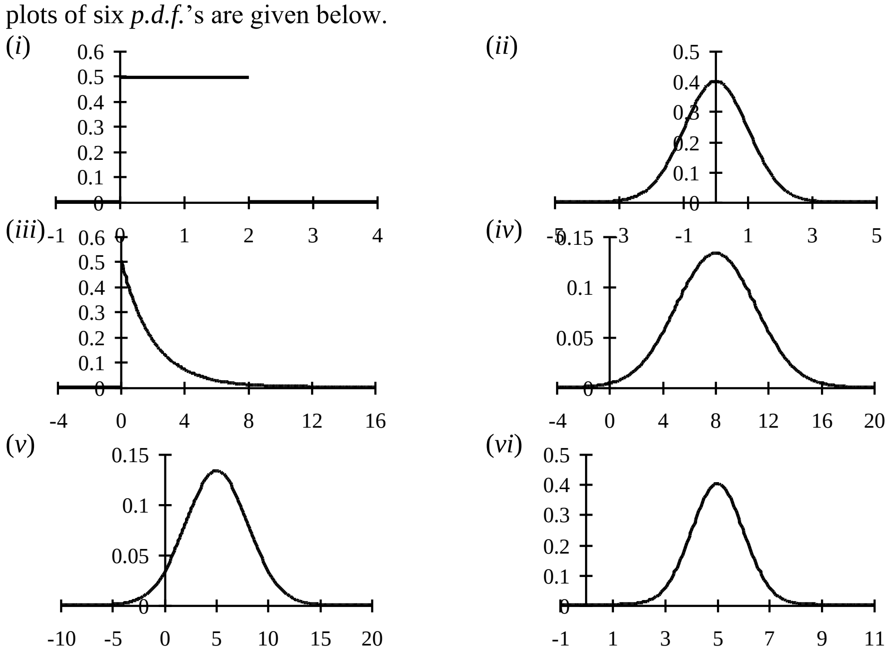
   2, 1, 5, 10, 1, 10, 5, 2

   (e) Find $\bar{y}$.
   (f) Find s.

2. Approximately 62% of students who enroll in Math 115b have a 3.3 grade point average or higher; the rest do not. Let *G* be the binomial random variable that gives the number of Math 115b students with a 3.3 grade point average or higher. Assume that 700 students are enrolled in Math 115b this year.

   (a) Find $E(G)$.
   (b) Find $V(G)$.
   (c) Find σ_G.

3. The plots of six *p.d.f.*'s are given below.



   (a) Which one(s) could correspond to a standard normal random variable?
   (b) Which one(s) could correspond to a uniform random variable?
   (c) Which one(s) could correspond to an exponential random variable?
   (d) Which one(s) could ***not*** possibly correspond to a normal random variable?
   (e) Which one could correspond to a normal random variable with $\mu_X = 5$ and $\sigma_X = 3$?

4. Let *V* be the random variable that gives the value of an oil lease similar to the one which is to be auctioned. A random sample of 36 historical values are used to estimate the mean of *V*. The sample mean is \$93 million and the sample standard deviation is \$13.4 million. Find and interpret a 95% confidence interval for μ_V.

5. A company that produces snack food has calibrated its packaging machines to produce bags of potato chips with an average weight of 588 grams with a standard deviation of 12 grams. Assume that the weights of the bags are normally distributed.

   (a) Explain what is meant by a standard deviation of 12 grams in terms of this example.
   (b) What is the probability that the weight of a randomly selected bag exceeds 600 grams?

6. A 50 kg sack of flour contains a weight of flour that is normally distributed with mean 52 kg and standard deviation 2 kg. Give approximate answers to these questions.
   (a) What is the probability of a sack being underweight (that is containing less than 50 kg)?
   (b) What is the probability of a sack containing less than 48 kg?
   (c) What is the probability of a sack containing more than 54 kg?
   (d) What is the probability of four randomly selected sacks having an average weight of less than 50 kg?

7. Match the expressions on the left with their values on the right. A value may be used more than once.

$(i)\ \int_0^\infty \frac{1}{5} e^{-x/5} dx$	A. 5
$(ii)\ \int_0^\infty x \cdot \frac{1}{5} e^{-x/5} dx$	B. 25
$(iii)\ \int_0^\infty (x-5)^2 \cdot \frac{1}{5} e^{-x/5} dx$	C. 1
$(iv)\ \int_{-1}^{4} 0.2\, dx$	D. 1.5
	E. 0.2

8. Let X be the random variable which gives the number of customers who visit your business in a given day. You know that the parameters of X are $\mu_X = 30$ and $\sigma_X = 6$, but you do not know the *p.d.f.* or the *c.d.f.* for X. Let $\bar{x}$ be the random variable that is the mean of a random sample of size $n = 80$ days.
   (a) Compute $\mu_{\bar{X}}$.
   (b) Compute $V(\bar{X})$.
   (c) Compute $\sigma_{\bar{X}}$.
   (d) Give a formula for the random variable, S, that is the standardization of $\bar{x}$.
   (e) What is the approximate distribution of S?

9. The *p.d.f.* and *c.d.f.* of T, the weekly CPU time (in hours) used by an accounting firm, are given below.

$$f_T(t) = \begin{cases} 0 & \text{if } t < 0 \\ \frac{3}{64} t^2 (4-t) & \text{if } 0 \le t \le 4 \\ 0 & \text{if } t > 4 \end{cases} \qquad F_T(t) = \begin{cases} 0 & \text{if } t < 0 \\ \frac{1}{256} t^3 (16-3t) & \text{if } 0 \le t \le 4 \\ 1 & \text{if } t > 4 \end{cases}$$

   (a) Set up, but do not evaluate, an integral that gives the probability that the CPU time used by the firm in a given week is at least 90 minutes.
   (b) Use the *c.d.f.* to find the probability that the CPU time used by the firm in a given week is at least 90 minutes.