



(12.5 points) 3. Z has the standard normal distribution. Find the probabilities below, using a calculator, writing down the calculator command line.  
Draw a **diagram** of the normal curve with appropriate shading in each part.

(a)  $P(0 \leq z \leq 1.23)$  (Draw a graph.)

(b)  $P(z \geq 1.23)$  (Draw a graph.)

(c)  $P(z \geq -1.23)$  (Draw a graph.)

(d)  $z_0$ , so that  $P(z \geq z_0) = 12\%$  (Draw a graph.)

(e)  $z_0$ , so that  $P(|z| \geq z_0) = 12\%$  (Draw a graph.)

(12.5 points) 4. (a) Compute  $P(12, 4)$

(b) Compute  $\binom{12}{4}$

(c) When is it reasonable to use the normal approximation to the binomial?

(d) When is it reasonable to assume the sampling distribution of the mean,  $\bar{X}$ , is normal?

(e) The random variable  $Y$  is normally distributed, with mean 33 and standard deviation 4.5. Find  $P(29 \leq Y \leq 40)$

(12.5 points) 5. Let  $X$  be the number of successes in  $n = 5400$  independent trials where the probability of success on each trial is  $p = 0.6$ . Find

(a) the **mean** value of  $X$

(b) the **standard deviation** of  $X$

(c)  $P(X = 3241)$  by using the **normal approximation** to the binomial.

(d)  $P(3201 \leq X \leq 3270)$  by using the **normal approximation** to the binomial.

- (12.5 points) 6. The heights of **225** trees in a sample are measured. If the **population mean** is **3.34** m with a **population standard deviation** of **0.75** m, find the probability that the **sample mean** is **less than 3.40** m.
- (12.5 points) 7. If the **sample mean** is **25** for a sample of size **210**, and the population standard deviation is **7.50**, find the **88% confidence interval** for the population mean. Give the endpoints accurate to three or more decimal places.

- (12.5 points) 8. Using a sample of size  $n$ , the endpoints of a confidence interval for the population mean are given by  $\bar{x} \pm 1.5982(\sigma/\sqrt{n})$ .
- (a) What is the value of  $\alpha$ ? (Can round to three digits.)
- (b) What is the **confidence level**?
- (c) If  $\sigma$  is 6.0, find a **minimum sample size** so that the maximum error,  $E$ , is under 0.05 in size.

- (12.5 points) 9. 45% of the people in a club are male. 20% of the males in the club are under age 30, and 25% of the females in the club are under age 30.  
Use a **Venn diagram** to find the probability that a randomly chosen club member is
- (a) under age 30
- (b) female, given that the member is under age 30.

( 100 points, total. )