**Answers using TI 83:**

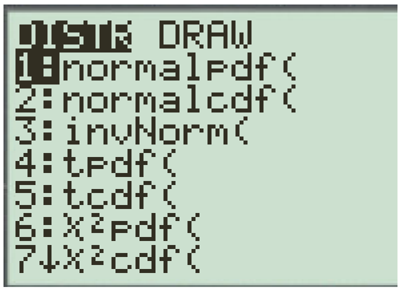
A multiple choice test has 10 questions. Each question has four answer choices. What is the probability that a student, choosing answers at random:

**1a**. Gets 7 questions correct (exactly 7)?

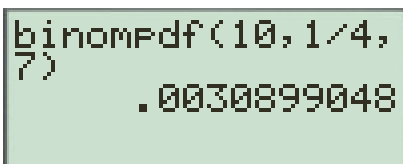
Number of trials is n=10, probability of success is p=1/4 =0.25

Proceed:

2nd VARS (DISTR)




Select binompfd(10, ¼,7) # comment: the format is (n, p, x)




**1b**. Has at least one question correct?

At last one correct = 1 – P no correct (zero correct)

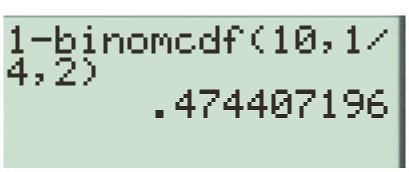
Type 1 – then repeat steps for 1a:

1- binompfd(10, ¼,0)


**1c**. Has at least 3 questions correct?

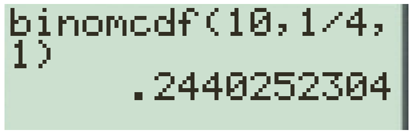
P at least 3 questions correct = 1- [ P(0)+P(1)+P(2)]

In this case, we use binomial cdf, which is the "cumulative" value from zero up to a given X, in this case 2.



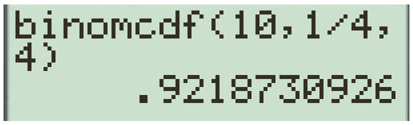
**1d**. Has at most 1 question correct?

"At most" means from zero to a number x, in this case 1. Therefore, we use binomial cdf:



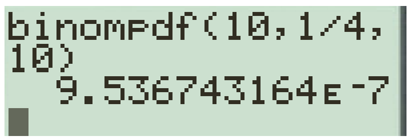

**1e.** Has at most 4 questions correct?

Same as 1d, just set x = 4.




**1f**. Has all questions correct?

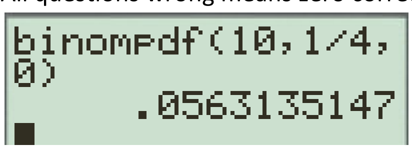
For all questions correct, set x = 10. That is 10 out of 10 correct, binomial pdf:




The output in scientific notation is $9.536743164 \times 10^{-7}$ as a decimal: 0.0000009536743164

**1g**. Has all questions wrong?

All questions wrong means zero correct. Binomial pdf:




**1h**. What is the mean number of correct questions the student may expect?

Means of the binomial distribution

$\mu = n \,.\, p = 10*1/4 = 2.5$

**1i**. What is the standard deviation of the variable *number of questions correct*?

$\sigma = \sqrt{n\,.\,p\,.\,q} = \sqrt{10\,.\frac{1}{4}.3/4} = 1.37$

**Note**: q = 1 – p = 1- ¼ = ¾.

**1j**. What is the minimum and maximum usual values of correct questions the student may expect?

The minimum usual value is given by $\mu - 2\sigma$ : 2.50 – 2 (1.37) = -0.24

The interpretation of this result: if someone answer 10 questions at random, with a probability of ¼ of being correct on each instance, it will be "usual" getting all questions wrong (zero correct). The value -0.24 doesn't have a physical meaning, since no one can go lower of zero correct.

The maximum usual value is given by $\mu + 2\sigma$ : 2.50 + 2 (1.37) = 2.5+2*1.37 = 5.24 So the test taker may expect up to 5 questions correct. Anything above that result will be "unusual" or exceptionally high.

**1k**. May we consider 6 as a usual number of correct questions under the conditions of this experiment?

Six questions correct would be an unusual high number of correct answers under the conditions of this experiment.