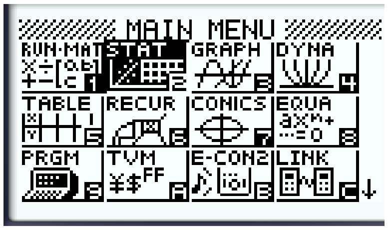
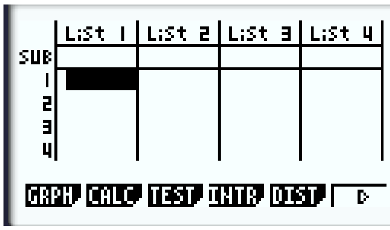
Answers using Casio 9750 GII:

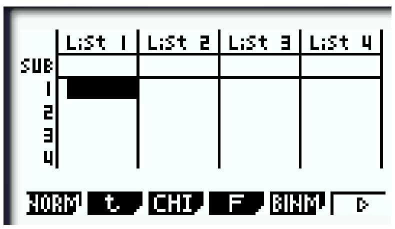
Choose STAT menu:



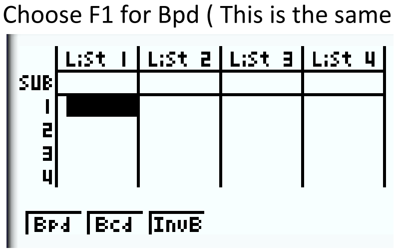
Then, F5 for DIST:



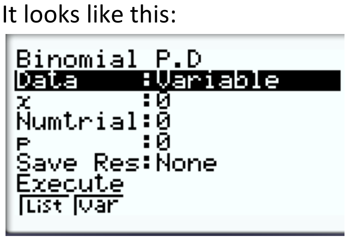
Again F5 for BINM:



Choose F1 for Bpd (This is the same function as binomial pdf):



It looks like this:

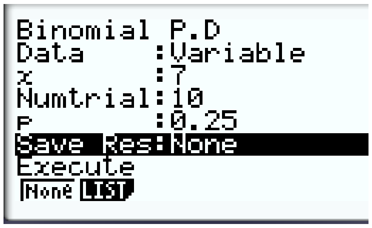


Question 1

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)?

Enter x = 7, N = 10, p = ¼



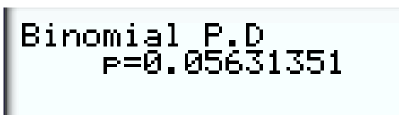
Press EXE:

Scientific notation: 3.0899×10^{-3} Equivalent to 0.0030899

1b. Has at least one question correct?

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

Repeat steps for 1a with x = 0, N= 10, p=1/4.



Then press MENU, and choose RUN-MAT:

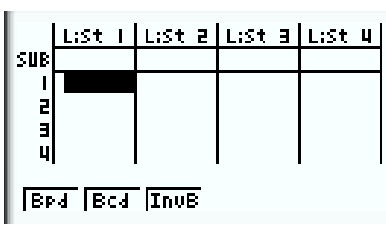
Proceed on the main screen to substitute the values into the formula:

At last one correct = 1 – P no correct (zero correct) = 1 – 0.0563 = 0.9437

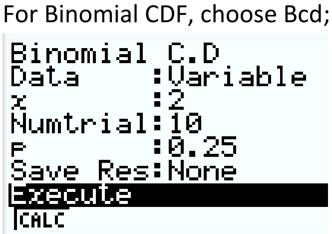
1c. Has at least 3 questions correct?

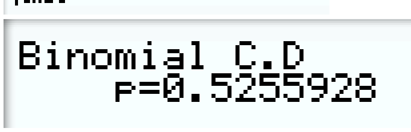
P at least 3 questions correct = 1- [P(0)+P(1)+P(2)]

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



For Binomial CDF, choose Bcd; then for x = 2, N= 10, p= ¼.

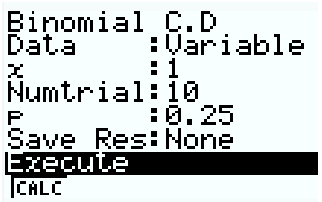




P at least 3 questions correct = 1- 0.5255928 = 0.4744 rounded to 4 decimal places.

1d. Has at most 1 question correct?

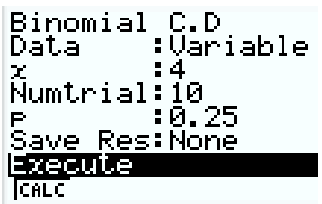
"At most" means from zero to a number x, in this case 1. Therefore, we use binomial Bcd:



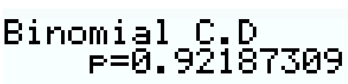
Execute:

1e. Has at most 4 questions correct?

Binomial cd, set x = 4:

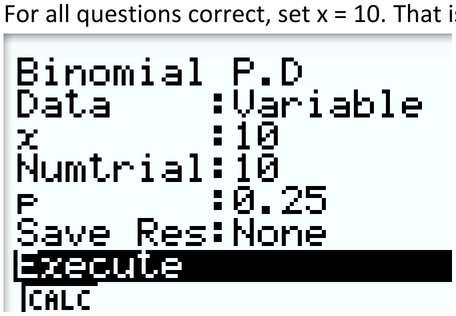


Execute:

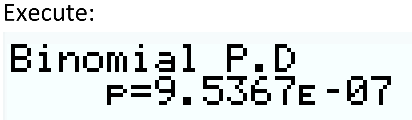


1f. Has all questions correct?

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



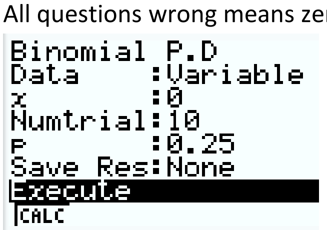
Execute:



Scientific notation: 9.5367×10^{-7} or 0.00000095367 as a decimal.

1g. Has all questions wrong?

All questions wrong means zero correct. Binomial pdf:



Execute:

```
Binomial P.D
    p=0.05631351
```

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*?

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

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.