

## Practice using the Normal Approximation to the Binomial

A fair coin is tossed 1600 times.

Approximate the chance of getting exactly 800 heads.

(Present answer to nearest one thousandth of 1%).

You must:

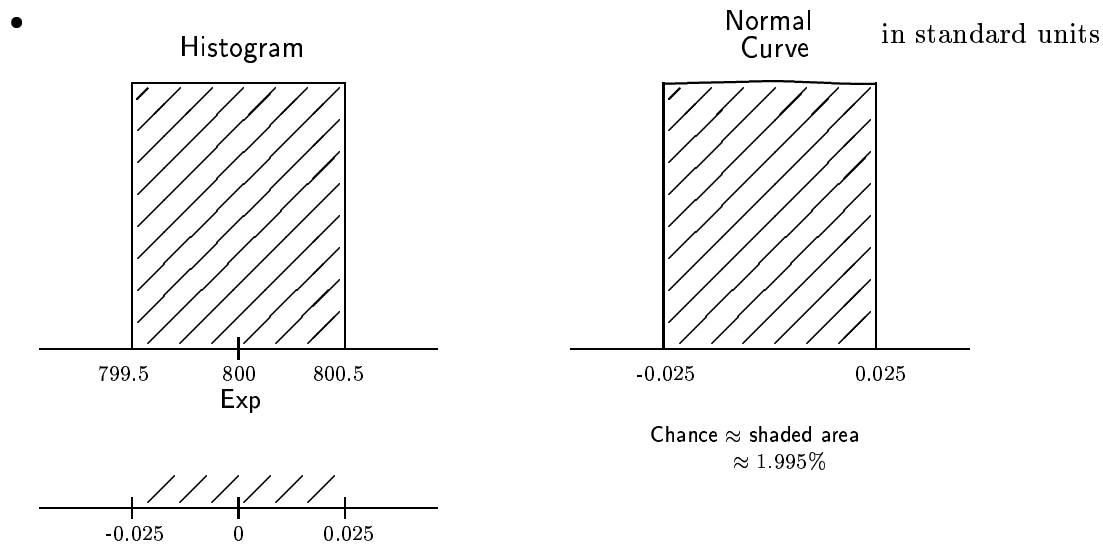
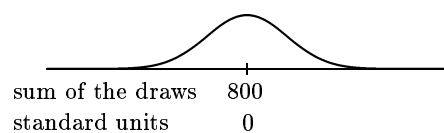
- Set up a box model with the correct number of tickets and the correct numbers on the tickets.
- Find the average and SD of that box.
- Derive a number from the draws from the box that will model the number of heads in the result of the coin tosses.
- Find the expected value and standard error of that derived number.
- Draw the normal curve and fix its center.
- Draw an appropriate block of the probability histogram, carefully noting its endpoints. (The continuity correction is required.) Shade the area that gives the desired chance. Then, next to it, draw an appropriate interval of the normal approximation, putting into standard units the endpoints, and shading the area under the curve for that interval.
- Find the numerical value of the shaded area. Use the normal table and your picture.

**Answers follow on next page.**

## Answers.

1.995%.

- The box has two tickets: one with a 1 on it and one with a 0 on it.
- The average is 0.5 and the SD is 0.5.
- The sum of the draws should be used.
- $EV = 800$ , and  $SE = 20$ .
- 



- 1.995%.

Calculation of the standard units:  $\frac{799.5 - 800}{20} = \frac{-0.5}{20} = -0.025$ , and similarly for 800.5.

Interpolation of 0.025 was used, it being half way between the listed values of  $z$  of 0.00 and 0.05.