Outline of lecture 2 - 24 - 10.

1. Find a $z$ so that $P(Z > z) = 0.04$. Use closest table entry and resolve ties in favor of the larger $z$.

2. Find a $z$ so that $P(Z < z) = 0.03$. Use closest table entry and resolve ties in favor of the smaller $z$.

3. A sample of $n = 400$ surgeries finds 32 that required a repeat surgery. Determine the P-value of a test the null hypothesis that the probability $p$ that a surgery needs to be repeated is 0.06 versus the alternative hypothesis that $p$ exceeds 0.6.

4. A journal requires P-value < 0.0001 in order to publish. What fraction of submissions having no merit nonetheless meet this criterion?

5. A sample of 900 x-ray orders finds 80 for which additional images are ordered. Determine the P-value of a test of the hypothesis that 12% of x-ray orders require such additional orders versus the alternative that fewer than 12% require additional orders.

6. Design a test to "call an election" with:
   - $p =$ fraction of the population voting Republican
   - $X =$ number in sample voting Republican
   - null hypothesis: Democrat wins ($p \leq 0.5$)
   - alternative hypothesis: Republican wins ($p > 0.5$)
   - David-Goliath setup specifications:
     - $p_0 = 0.48$ $P$(reject $H_0$ if $p = 0.48$) $\sim$ 0.01
     - $p_1 = 0.52$ $P$(fail to reject $H_0$ if $p = 0.52$) $\sim$ 0.01
   - find $z_0$ with $P(Z > z_0) \sim 0.01$
find $z_1$ with $P(Z < z_1) \sim 0.01$

Determine $n$ and $c$ of the test that "calls the election for the Republican if $X \geq c$ and otherwise calls it for the Democrat."

\[
n = \left( \frac{\sqrt{p_0 q_0} \mid z_0 \mid + \sqrt{p_1 q_1} \mid z_1 \mid}{p_0 - p_1} \right)^2
\]

\[
c = z_0 \sqrt{n p_0 q_0} + 0.5 + np_0
\]

The test should be made to treat both Democrats and Republicans exactly equally. Whatever $c$ turns out to be just double it and subtract one to get a new $n$ treating both parties equally.

7. Historically, 20% of orders are returned. A test of the hypothesis that 20% of orders are returned versus the two-sided alternative that other than 20% are returned finds 33 from a sample of 100 are returned. Determine the P-value.