cheg304 hw7 q3

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part 1

here our hypotheses are the following

- null: proportion of UD BChE grads who experienced a year of unemployment is the same or greater than the propotion for all BChE grads
- alternative: proportion of UD BChE grads who experienced a year of unemployment is lower than the propotion for all BChE grads

in math, where π is the proportion of UD BChE graduates and P is the proportion of all such graduates

$$H_0 : \pi \geq P$$

$$H_a : \pi < P$$

part 2

we need to check if we can use our z distribution using the rule of thumb from the textbook

```
import numpy as np
p0 = 0.152
n = 100
I0 = (p0 - 3 * np.sqrt(p0 * (1 - p0) / n), p0 + 3 * np.sqrt(p0 * (1 - p0) / n))
print(f'I_0 interval: {np.round(I0,3)}')
```

```
I_0 interval: [0.044 0.26 ]
```

now that the interval does not contain 0 or 1, we can use the z distribution using the standard deviation of the binomial distribution

$$z = \frac{\pi - P}{\sqrt{\frac{P(1-P)}{n}}}$$

```
z = (0.09 - p0) / (np.sqrt(p0 * (1 - p0))/10)
print(f'z: {z:.3f}')
```

```
z: -1.727
```

now we can calculate the p value

```
from scipy.stats import norm
p = norm.cdf(z)
print(f'p: {p:.3f}')
```

```
p: 0.042
```

part 3

we reject the null because $p < \alpha$.

part 4

we reject the null and conclude the proportion of UD BChE graduates experiencing 1 year of unemployment is less than the proportion of all BS degree holders in all engineering disciplines across the country. we're fairing better! (because unemployment of recent graduates is a bad thing)

```
# filler
```