Tanmoy Das

Distribution related problems and their solutions

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using data from normal-greater-than · Public Make Private

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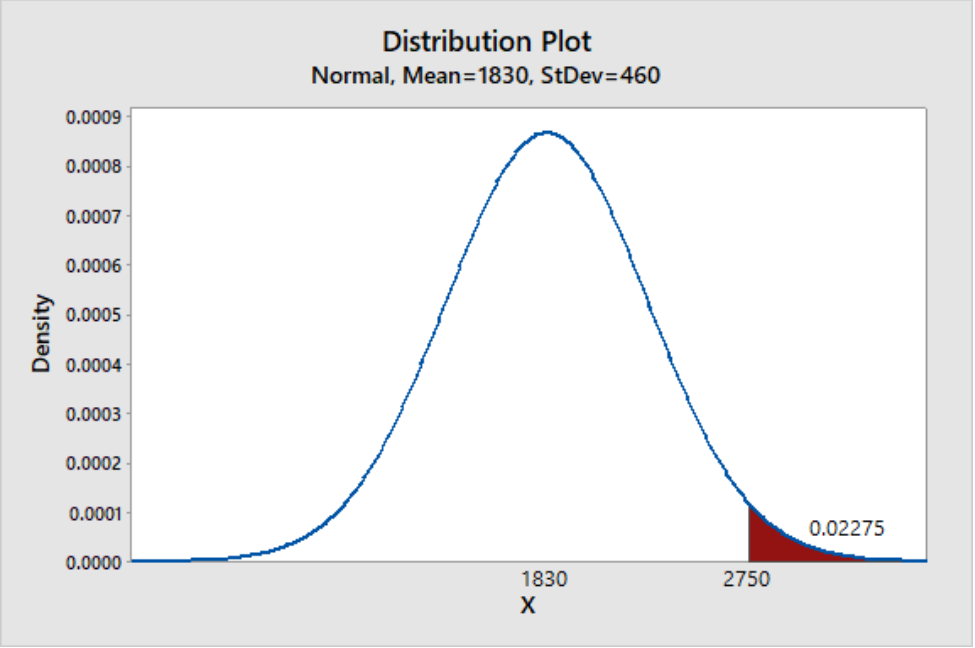
Notebook

In [1]:
```
# -*- coding: utf-8 -*-
"""
Created on Sun Sep 16 19:00:12 2018
@author: TANMOY DAS
"""
```

Out[1]:
```
'\nCreated on Sun Sep 16 19:00:12 2018\n@author: TANMOY DAS\n'
```

Normal Distribution

Math problem 1



A Gaussian random variable has a mean of 1830 and standard deviation of 460 Find the probability that the variable will be greater than 2750. Reference: Normal Distribution; Page 294, Chapter 5, FE - IE specific

In [2]:
```
# greater than
import scipy.stats
mean_normal = 1830
standard_deviation_normal = 460
probability_norm_gt = scipy.stats.norm.sf(2750, mean_normal,standard_deviati
on_normal) # greater than
```

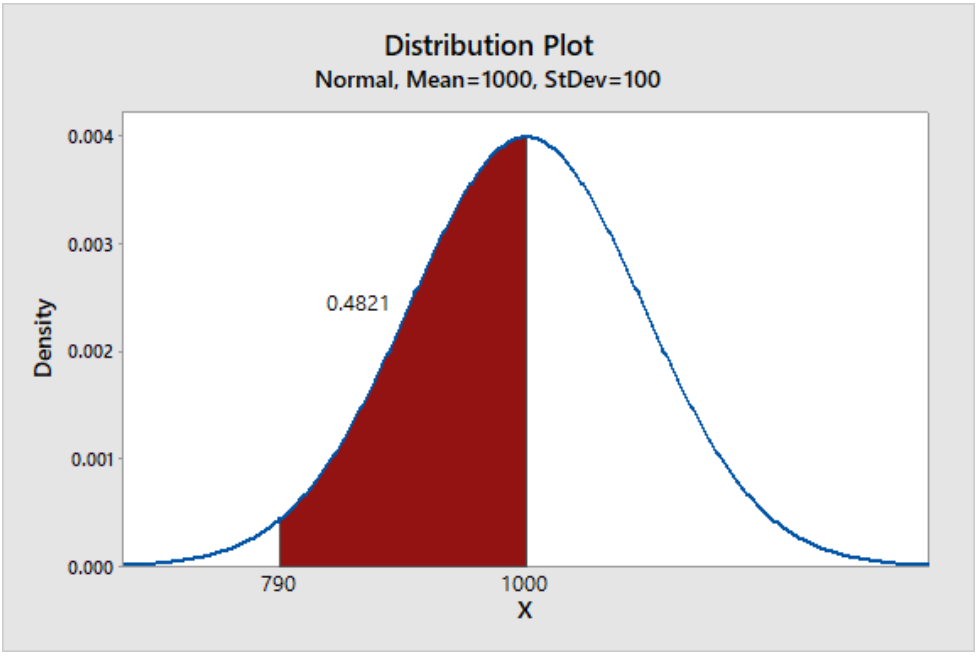
Math Problem 2

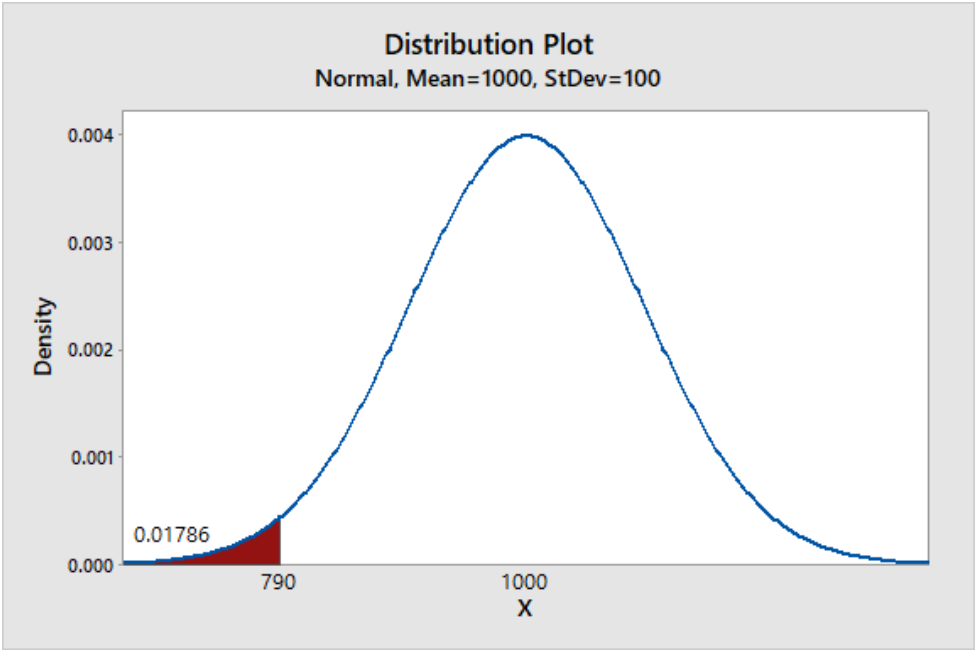
The distribution of weekly incomes follows the normal probability distribution, with a mean of $1,000 & a

standard deviation of $100. What is the probability of selecting a shift foreman in the glass industry whose income is:

1. Between $790 and $1,000?
2. Less than $790?

Reference: Normal Distribution; Page 235, Chapter 7, Statistical techniques in Business by Lind





In [3]:

```
import scipy.stats
# in between
mean_normal = 1000
standard_deviation_normal = 100
probability_norm_lt = scipy.stats.norm.cdf(1000, mean_normal,standard_deviat
ion_normal)
```

```
probability_norm_gt = scipy.stats.norm.cdf(790, mean_normal,standard_deviati
on_normal) # greater than
probability_in_between = probability_norm_lt - probability_norm_gt
```

In [4]:

```
# less than
mean_normal = 1000
standard_deviation_normal = 100
probability_norm_lt = scipy.stats.norm.cdf(790, mean_normal,standard_deviati
on_normal)
```

Problem 3

In [5]:

```
#To find the variate for which the probability is given, let's say the
#value which needed to provide a 98% probability, you'd use the
#PPF Percent Point Function
probability_given = scipy.stats.norm.ppf(.98,100,12)
```

Poission Distribution

Math Problem 1

Assume baggage is rarely lost by Delta Airlines. Most flights do not experience any mishandled bags; some have one bag lost; a few have two bags lost; rarely a flight will have three lost bags; and so on. Suppose a random sample of 1,000 flights shows a total of 300 bags were lost. Determine the probability of losing no bag. Source: P 208, Chapter 6, Lind

In [6]:

```
import scipy.stats
mean_poisson = 300/1000
# prob = poisson.cdf(x, mu); x= random variable; mu = mean
probability_poisson = scipy.stats.poisson.cdf(0, mean_poisson)
```

Math Problem 2

Coastal Insurance Company underwrites insurance for beachfront properties along the Virginia, North and South Carolina, and Georgia coasts. It uses the estimate that the probability of a named Category III hurricane (sustained winds of more than 110 miles per hour) or higher striking a particular region of the coast (for example, St. Simons Island, Georgia) in any one year is .05. If a homeowner takes a 30-year mortgage on a recently purchased property in St. Simons, what is the likelihood that the owner will experience at least one hurricane during the mortgage period? Ref: P210, Chapter 6, Lind

In [7]:

```
import scipy.stats
mean_poisson = 30*.05
# n is the number of years, 30 in this case.
# \pi is the probability a hurricane meeting the strength criteria comes ashor
e.
# \mu is the mean or expected number of storms in a 30-year period.
from IPython.display import display, Math, Latex
display(Math(r'P(x \geq 1) = 1 - P(X=0)'))
probability_poisson = 1 - scipy.stats.poisson.cdf(0, mean_poisson)
```

$$P(x \geq 1) = 1 - P(X = 0)$$

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