ME 1020 Engineering Programming with MATLAB

Problem 7.9:

9. Measurements of a number of fittings show that the pitch diameter of the thread is normally distributed with a mean of 8.007 mm and a standard deviation of 0.005 mm. The design specifications require that the pitch diameter be 8 ± 0.01 mm. Estimate the percentage of fittings that will be within tolerance.

Problem setup:

$$P(a \leq x \leq b) = \frac{1}{2}\left[\text{erf}\left(\frac{b - \mu}{\sigma\sqrt{2}}\right) + \text{erf}\left(\frac{a - \mu}{\sigma\sqrt{2}}\right)\right]$$

$$a = 7.99, \quad b = 8.01, \quad \sigma = 0.005, \quad \mu = 8.007$$

$$P(7.99 \leq x \leq 8.01) = \frac{1}{2}\left[\text{erf}\left(\frac{8.01 - 8.007}{0.005\sqrt{2}}\right) - \text{erf}\left(\frac{7.99 - 8.007}{0.005\sqrt{2}}\right)\right]$$

```
% Problem 7.9
clear
clc
disp('Problem 7.9: Scott Thomas')
mu = 8.007;
a = 7.99;
b = 8.01;
sigma = 0.005;

P3 = 0.5*(erf((b - mu)/(sigma*sqrt(2))) - erf((a - mu)/(sigma*sqrt(2))))
```

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Problem 7.9: Scott Thomas

P3 =

   725.4100e-003
```