MTH 122 — Calculus II

Essex County College — Division of Mathematics and Physics[1]

Project #2 — Sakai Web Project Material

Name: ______________________________

Signature: ______________________________

The following question is worth ten points total, and will be added to your WebAssign grades. Only correct answers will be accepted. Due date will be announce in class.[2]

1. When I ask my calculator to evaluate

$$\int_2^{12} \frac{1}{5\sqrt{2\pi}} e^{-\frac{(x-7)^2}{50}}\, \mathrm{d}x \tag{1}$$

I get an approximate answer,

$$\int_2^{12} \frac{1}{5\sqrt{2\pi}} e^{-\frac{(x-7)^2}{50}}\, \mathrm{d}x \approx \boxed{0.682689492137}.$$

The Mathematica code for doing the integral above numerically, and then using a **left endpoint approximation** method with $n = 1000$ is given below. This example code work will be of key importance if you decide to use Mathematica for this project—it actually contains the answer for the first question.

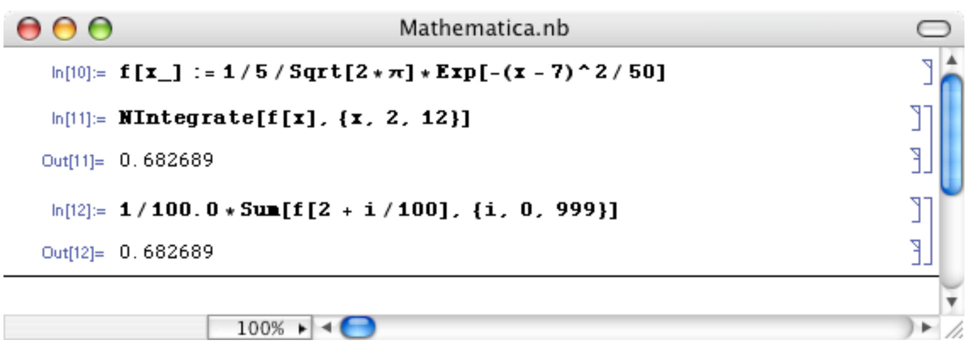

Figure 1: Sample Code

The following evaluations should be done using Mathematica or other CAS system, or using a structure[3] programming language. I have included answers, so you just need to copy what I've done using whatever system you like. Again, *please submit the code work!*

[1] This document was prepared by Ron Bannon (ron.bannon@mathography.org) using LaTeX 2ε. Last revised January 10, 2009.

[2] Project questions are assigned on occasion, and have strict due dates that must be adhered to.

[3] Any language, but you must submit the code electronically in ASCII format.

(a) Evaluate this integral (1) using the **left endpoint approximation** method with $n = 1000$, final answer should be accurate to six decimal places of accuracy.

Here's what I did on a TI-89.

i. $\frac{1}{5\sqrt{2\pi}}e^{-\frac{(x-7)^2}{50}} \to f(x)$

ii. $\frac{1}{100.0} \cdot \sum_{i=0}^{999} f\left(2.0 + \frac{i}{100.0}\right) \approx \boxed{0.682689}$

(b) Evaluate this integral (1) using the **right endpoint approximation** method with $n = 1000$, final answer should be accurate to six decimal places of accuracy.

Here's what I did on a TI-89.

i. $\frac{1}{5\sqrt{2\pi}}e^{-\frac{(x-7)^2}{50}} \to f(x)$

ii. $\frac{1}{100.0} \cdot \sum_{i=1}^{1000} f\left(2.0 + \frac{i}{100.0}\right) \approx \boxed{0.682689}$

(c) Evaluate this integral (1) using the **midpoint rule** method with $n = 1000$, final answer should be accurate to six decimal places of accuracy.

Here's what I did on a TI-89.

i. $\frac{1}{5\sqrt{2\pi}}e^{-\frac{(x-7)^2}{50}} \to f(x)$

ii. $\frac{1}{100.0} \cdot \sum_{i=1}^{1000} f\left(2.0 + \frac{2i-1}{200.0}\right) \approx \boxed{0.682690}$

(d) Evaluate this integral (1) using the **trapezoidal rule** method with $n = 1000$, final answer should be accurate to six decimal places of accuracy.

Here's what I did on a TI-89.

i. $\frac{1}{5\sqrt{2\pi}}e^{-\frac{(x-7)^2}{50}} \to f(x)$

ii. $\frac{f(2.0) + f(12.0)}{200.0} + \frac{1}{100.0} \cdot \sum_{i=1}^{999} f\left(2.0 + \frac{i}{100.0}\right) \approx \boxed{0.682689}$

(e) Evaluate this integral (1) using the **Simpson's rule** method with $n = 1000$, final answer should be accurate to six decimal places of accuracy.

Here's what I did on a TI-89.[4]

i. $\frac{1}{5\sqrt{2\pi}}e^{-\frac{(x-7)^2}{50}} \to f(x)$

ii. $\frac{f(2) + f(12)}{300.0} + \frac{4}{300} \cdot \sum_{i=1}^{500} f\left(2 + \frac{2i-1}{100}\right) + \frac{2}{300} \cdot \sum_{i=1}^{499} f\left(2 + \frac{2i}{100}\right) \approx \boxed{0.682689}$

[4]Notice that I am only use one number with a decimal point, this will force an *approximation*.