DeVry University Summer 2007

Math 230: Applied Calculus II Matlab Assignment #1A

Due Wednesday Week #3 (8/2/07)

Title: Numerical Integration

Objectives: To learn how to use Matlab to manipulate arrays,
To become familiar with basic methods of numeric integration,
To understand the differences between the various methods

Instructions:

(1) Construct two arrays of integers from 1 to 10 and from 1 to 1000 assigning each to a variable. *DON'T DISPLAY THE SECOND ARRAY!*
(2) **Use these arrays** to construct two new equally spaced arrays. The first will start at 0.2 and end at 2. The second will start at 0.002 and end at 2.
(3) Plug the values from these two arrays into $f(x) = \frac{1}{2+x^3}$.
(4) Use the the output from the last step to determine two approximate values for $\int_0^2 \frac{1}{2+x^3}\,dx$.
(5) Alter the input values so that they have the same spacing but start at 0.1 and 0.001.
(6) Again, approximate $\int_0^2 \frac{1}{2+x^3}\,dx$.
(7) How do these values compare with the exact value of 0.64759208691483034906?

```
% Computes the integral of tan^{-1}(x) from 0 to 1 which
% equals π/4 − (1/2) ln 2
clc
format compact
format long
a=0, b=1, n1=10
dx1=(b-a)/n1
x1=[a+dx1:dx1:b] % Break up the interval into 10 parts
y1=atan(x1) % 10 rectangles based upon height of right endpoint
ymid1=atan(x1-dx1/2) % 10 rectangles using the midpoint as your height
sum(y1)*dx1 % sum of rectangles
sum(ymid1)*dx1 % sum of midpoints
% Repeat with 1000 rectangles
n2=1000
dx2=(b-a)/n2
x2=[a+dx2:dx2:b]; % Note the semicolon
y2=atan(x2); % Another semicolon
ymid2=atan(x2-dx2/2);
sum(y2)*dx2
sum(ymid2)*dx2
% How do these values compare with exact=pi/4-1/2*log(2)?
```

DeVry University Summer 2007

Math 230: Applied Calculus II Matlab Assignment #1B

Due Wednesday Week #3 (8/2/07)

Title: Numerical Integration

Objectives: To learn how to use Matlab to manipulate arrays,
To become familiar with basic methods of numeric integration,
To understand the differences between the various methods

Instructions:

(1) Construct two arrays of integers from 1 to 10 and from 1 to 1000 assigning each to a variable. *DON'T DISPLAY THE SECOND ARRAY!*

(2) **Use these arrays** to construct two new equally spaced arrays. The first will start at 0.3 and end at 3. The second will start at 0.003 and end at 3.

(3) Plug the values from these two arrays into $f(x) = \frac{1}{3+x^3}$.

(4) Use the the output from the last step to determine two approximate values for $\int_0^3 \frac{1}{3+x^3}\,dx$.

(5) Alter the input values so that they have the same spacing but start at 0.15 and 0.0015.

(6) Again, approximate $\int_0^3 \frac{1}{3+x^3}\,dx$.

(7) How do these values compare with the exact value of 0.52807738300985014506?

```
% Computes the integral of tan^{-1}(x) from 0 to 1 which
% equals π/4 − 1/2 ln 2
clc
format compact
format long
a=0, b=1, n1=10
dx1=(b-a)/n1
x1=[a+dx1:dx1:b] % Break up the interval into 10 parts
y1=atan(x1) % 10 rectangles based upon height of right endpoint
ymid1=atan(x1-dx1/2) % 10 rectangles using the midpoint as your height
sum(y1)*dx1 % sum of rectangles
sum(ymid1)*dx1 % sum of midpoints
% Repeat with 1000 rectangles
n2=1000
dx2=(b-a)/n2
x2=[a+dx2:dx2:b]; % Note the semicolon
y2=atan(x2); % Another semicolon
ymid2=atan(x2-dx2/2);
sum(y2)*dx2
sum(ymid2)*dx2
% How do these values compare with exact=pi/4-1/2*log(2)?
```

Math 230: Applied Calculus II Matlab Assignment #1C

Due Wednesday Week #3 (8/2/07)

Title: Numerical Integration

Objectives: To learn how to use Matlab to manipulate arrays,
To become familiar with basic methods of numeric integration,
To understand the differences between the various methods

Instructions:

(1) Construct two arrays of integers from 1 to 10 and from 1 to 1000 assigning each to a variable. *DON'T DISPLAY THE SECOND ARRAY!*

(2) **Use these arrays** to construct two new equally spaced arrays. The first will start at 0.4 and end at 4. The second will start at 0.004 and end at 4.

(3) Plug the values from these two arrays into $f(x) = \frac{1}{4+x^3}$.

(4) Use the the output from the last step to determine two approximate values for $\int_0^4 \frac{1}{4+x^3}\,dx$.

(5) Alter the input values so that they have the same spacing but start at 0.2 and 0.002.

(6) Again, approximate $\int_0^4 \frac{1}{4+x^3}\,dx$.

(7) How do these values compare with the exact value of 0.44937322460184861012?

```
% Computes the integral of tan^{-1}(x) from 0 to 1 which
% equals π/4 − (1/2) ln 2
clc
format compact
format long
a=0, b=1, n1=10
dx1=(b-a)/n1
x1=[a+dx1:dx1:b] % Break up the interval into 10 parts
y1=atan(x1) % 10 rectangles based upon height of right endpoint
ymid1=atan(x1-dx1/2) % 10 rectangles using the midpoint as your height
sum(y1)*dx1 % sum of rectangles
sum(ymid1)*dx1 % sum of midpoints
% Repeat with 1000 rectangles
n2=1000
dx2=(b-a)/n2
x2=[a+dx2:dx2:b]; % Note the semicolon
y2=atan(x2); % Another semicolon
ymid2=atan(x2-dx2/2);
sum(y2)*dx2
sum(ymid2)*dx2
% How do these values compare with exact=pi/4-1/2*log(2)?
```

Math 230: Applied Calculus II Matlab Assignment #1D

Due Wednesday Week #3 (8/2/07)

Title: Numerical Integration

Objectives: To learn how to use Matlab to manipulate arrays,
To become familiar with basic methods of numeric integration,
To understand the differences between the various methods

Instructions:

(1) Construct two arrays of integers from 1 to 10 and from 1 to 1000 assigning each to a variable. *DON'T DISPLAY THE SECOND ARRAY!*

(2) **Use these arrays** to construct two new equally spaced arrays. The first will start at 0.5 and end at 5. The second will start at 0.005 and end at 5.

(3) Plug the values from these two arrays into $f(x) = \frac{1}{5+x^3}$.

(4) Use the the output from the last step to determine two approximate values for $\int_0^5 \frac{1}{5+x^3}\,dx$.

(5) Alter the input values so that they have the same spacing but start at 0.25 and 0.0025.

(6) Again, approximate $\int_0^5 \frac{1}{5+x^3}\,dx$.

(7) How do these values compare with the exact value of 0.39385266363774443557?

```
% Computes the integral of tan^{-1}(x) from 0 to 1 which
% equals π/4 − (1/2) ln 2
clc
format compact
format long
a=0, b=1, n1=10
dx1=(b-a)/n1
x1=[a+dx1:dx1:b] % Break up the interval into 10 parts
y1=atan(x1) % 10 rectangles based upon height of right endpoint
ymid1=atan(x1-dx1/2) % 10 rectangles using the midpoint as your height
sum(y1)*dx1 % sum of rectangles
sum(ymid1)*dx1 % sum of midpoints
% Repeat with 1000 rectangles
n2=1000
dx2=(b-a)/n2
x2=[a+dx2:dx2:b]; % Note the semicolon
y2=atan(x2); % Another semicolon
ymid2=atan(x2-dx2/2);
sum(y2)*dx2
sum(ymid2)*dx2
% How do these values compare with exact=pi/4-1/2*log(2)?
```

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Math 230: Applied Calculus II Matlab Assignment #1E

Due Wednesday Week #3 (8/2/07)

Title: Numerical Integration

Objectives: To learn how to use Matlab to manipulate arrays,
To become familiar with basic methods of numeric integration,
To understand the differences between the various methods

Instructions:

(1) Construct two arrays of integers from 1 to 10 and from 1 to 1000 assigning each to a variable. *DON'T DISPLAY THE SECOND ARRAY!*

(2) **Use these arrays** to construct two new equally spaced arrays. The first will start at 0.6 and end at 6. The second will start at 0.006 and end at 6.

(3) Plug the values from these two arrays into $f(x) = \frac{1}{6+x^3}$.

(4) Use the the output from the last step to determine two approximate values for $\int_0^6 \frac{1}{6+x^3}\,dx$.

(5) Alter the input values so that they have the same spacing but start at 0.3 and 0.003.

(6) Again, approximate $\int_0^6 \frac{1}{6+x^3}\,dx$.

(7) How do these values compare with the exact value of 0.35247304766451745968?

```
% Computes the integral of tan^{-1}(x) from 0 to 1 which
% equals π/4 − (1/2) ln 2
clc
format compact
format long
a=0, b=1, n1=10
dx1=(b-a)/n1
x1=[a+dx1:dx1:b] % Break up the interval into 10 parts
y1=atan(x1) % 10 rectangles based upon height of right endpoint
ymid1=atan(x1-dx1/2) % 10 rectangles using the midpoint as your height
sum(y1)*dx1 % sum of rectangles
sum(ymid1)*dx1 % sum of midpoints
% Repeat with 1000 rectangles
n2=1000
dx2=(b-a)/n2
x2=[a+dx2:dx2:b]; % Note the semicolon
y2=atan(x2); % Another semicolon
ymid2=atan(x2-dx2/2);
sum(y2)*dx2
sum(ymid2)*dx2
% How do these values compare with exact=pi/4-1/2*log(2)?
```