

Math 230: Applied Calculus II Matlab Assignment #1A

Due Monday Week #3 (11/14/05)

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)
```

Math 230: Applied Calculus II Matlab Assignment #1B

Due Monday Week #3 (11/14/05)

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  $\frac{\pi}{4} - \frac{1}{2} \ln 2$ 
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 Monday Week #3 (11/14/05)

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 0.39385266363774443555?

```

% Computes the integral of tan-1(x) from 0 to 1 which
% equals  $\frac{\pi}{4} - \frac{1}{2} \ln 2$ 
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 Monday Week #3 (11/14/05)

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 0.7 and end at 7. The second will start at 0.007 and end at 7.
- (3) Plug the values from these two arrays into $f(x) = \frac{1}{7+x^3}$.
- (4) Use the the output from the last step to determine two approximate values for $\int_0^7 \frac{1}{7+x^3} dx$.
- (5) Alter the input values so that they have the same spacing but start at 0.35 and 0.0035.
- (6) Again, approximate $\int_0^7 \frac{1}{7+x^3} dx$.
- (7) How do these values compare with the exact value of 0.32032325223490927123?

```

% 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 #1E

Due Monday Week #3 (11/14/05)

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 0.8 and end at 8. The second will start at 0.008 and end at 8.
- (3) Plug the values from these two arrays into $f(x) = \frac{1}{8+x^3}$.
- (4) Use the the output from the last step to determine two approximate values for $\int_0^8 \frac{1}{8+x^3} dx$.
- (5) Alter the input values so that they have the same spacing but start at 0.4 and 0.004.
- (6) Again, approximate $\int_0^8 \frac{1}{8+x^3} dx$.
- (7) How do these values compare with the exact value of 0.29453575067980391344?

```

% Computes the integral of tan-1(x) from 0 to 1 which
% equals  $\frac{\pi}{4} - \frac{1}{2} \ln 2$ 
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)

```