

INTERNET RESOURCES

TEACHER PLANS AND NOTES FOR WEB-BASED RESOURCES

Section I: The following pages are all from the Visual Calculus site at the University of Tennessee. Each of these pages presents either a problem set or a quiz for the students. Solutions are shown and feedback is immediate. Each of these can be used in the following ways:

1. In-class review of the topic
2. At-home review or assignment on the topic
3. Basis for a short reflection paper on the topic
4. Basis for group work / presentations
5. Remediation assignment for students who have not mastered the topic

Table of Contents (includes unit and indicator numbers):

1. I, indicator 2, algebraic limits
2. I, 1 – 4, limit theory & piecewise functions
3. I, 6 – 8, continuity
4. II, 3, definition of derivative
5. II, 7, product rule
6. II, 7, quotient rule
7. II, 7, product rule, w / trig.
8. II, 7, quotient rule, w / trig.
9. II, 8, chain rule
10. II, 9, implicit differentiation
11. II, review, mixed differentiation
12. III, 1, tangents to parametric curves
13. III, 1, tangents to implicit relations
14. III, 2, first derivative test (inc. / dec.)
15. III, 2, second derivative test for concavity
16. III, 2, graph properties
17. III, 2, graph properties
18. III, 5, max / min values
19. III, 6, mean value theorem

Table of Contents (continued)

- 20. III, 7, L'Hopital's Rule
- 21. III, 7, L'Hopital's Rule
- 22. IV, 4, substitution method of integration
- 23. IV, 3 – 5, mixed integration
- 24. V, 1, area between two curves
- 25. VI, 2, integration by parts
- 26. VI, 3, integration by partial fractions
- 27. VI, 5, improper integrals
- 28. VII, 7b, convergence of geometric series
- 29. VII, 7d, integral test of convergence
- 30. VII, 7e, limit comparison test
- 31. VII, 7f, ratio test
- 32. VII, 7g, alternating series test

1. UNIT I, INDICATOR 2

- DESCRIPTION:** Page is a 10-problem set of algebraic limit questions.
- FEATURES:** 1. Detailed solutions available for immediate feedback
- WEB ADDRESS:** <http://archives.math.utk.edu/visual.calculus/1/limits.15/index.html>
- RESULT:** Students will see a variety of algebraic limit problems and will have the opportunity to get immediate feedback on their answers.

2. UNIT I, INDICATORS 1 - 4

- DESCRIPTION:** Page is a quiz on graphically evaluating limits of piecewise functions.
- FEATURES:** 1. Changing graphs offer a wide range of questions
Problems are not always given in the same order
2. Immediate feedback on answers
- WEB ADDRESS:** <http://archives.math.utk.edu/visual.calculus/1/limits.19/index.html>
- RESULT:** Students should be reinforced in their knowledge and confidence of evaluating limits of piecewise functions.

3. UNIT I, INDICATORS 6 - 8

- DESCRIPTION:** A quiz on continuity and its consequences.
- FEATURES:** 1. 20-problem quiz of multiple choice questions

- Problems are not always given in the same order
2. Problems are fairly challenging in nature and will make students think

WEB ADDRESS: <http://archives.math.utk.edu/visual.calculus/1/continuous.8/index.html>

RESULT: Students will receive much practice and feedback on continuity questions.

4. UNIT II, INDICATOR 3

DESCRIPTION: Problems using the definition of a derivative

- FEATURES:**
1. A 10-problem set of definition of derivative questions
 2. Detailed solutions for immediate feedback

WEB ADDRESS: <http://archives.math.utk.edu/visual.calculus/2/definition.7/index.html>

RESULT: Students will practice finding a derivative by using its definition. Students will receive feedback quickly through detailed solutions.

5. UNIT II, INDICATOR 7

DESCRIPTION: Problem set of product rule derivatives with exponential and basic functions

- FEATURES:**
1. A 10-problem set of product rule derivatives
 2. Detailed solutions for each problem

WEB ADDRESS:
http://archives.math.utk.edu/visual.calculus/2/product_rule.1/index.html

RESULT: Students will receive immediate feedback on a variety of product rule problems.

6. UNIT II, INDICATOR 7

DESCRIPTION: Problem set of quotient rule derivatives with exponential and basic functions

- FEATURES:**
1. A 10-problem set of quotient rule derivatives
 2. Detailed solutions for each problem

WEB ADDRESS:
http://archives.math.utk.edu/visual.calculus/2/quotient_rule.1/index.html

10. UNIT II, INDICATOR 9

DESCRIPTION: A 10-problem set of implicit differentiation problems

FEATURES:

1. 10 above-average difficulty implicit relations
2. Problems are fairly challenging in nature and will make students think
3. Detailed solutions available for immediate feedback

WEB ADDRESS: <http://archives.math.utk.edu/visual.calculus/3/implicit.4/index.html>

RESULT: Students will practice using challenging problems, if they can understand these problems, they will have mastered implicit differentiation

11. UNIT II, REVIEW OF VARIOUS INDICATORS

DESCRIPTION: Quiz on differentiation of functions

FEATURES: A 60 problem quiz covering differentiation.

WEB ADDRESS: <http://archives.math.utk.edu/visual.calculus/2/formulas.2/index.html>

RESULT: Students will have ample practice in taking derivatives of exponential, trigonometric, logarithmic and basic functions using the chain rule, product rule and quotient rule

NOTE: for some reason, this quiz's site seems to be less stable than the others in the visual calculus site.

12. UNIT III, INDICATOR 1

DESCRIPTION: Page is a 10-problem set focusing on finding the line tangent to a parametric curve at a given point.

FEATURES:

1. Detailed solutions available for immediate feedback

WEB ADDRESS: <http://archives.math.utk.edu/visual.calculus/3/parametric.1/index.html>

RESULT: Students will gain practice in the following areas:

1. Finding ordered pairs given a t-value
2. Evaluating parametric derivatives
3. Creating equations of tangent lines

13. UNIT III, INDICATOR 1

DESCRIPTION: Problem set involving the equation of a line tangent to an implicit relation

FEATURES:

1. A 10-problem set of tangent line questions using implicit differentiation
2. Detailed solutions for immediate feedback

WEB ADDRESS: <http://archives.math.utk.edu/visual.calculus/3/implicit.5/index.html>

RESULT: Students will get to practice the following:

1. Implicit differentiation
2. Writing equations of tangent lines

14. UNIT III, INDICATOR 2

DESCRIPTION: Problem set of first derivative test questions

FEATURES:

1. A 10-problem set of functions (students find inc./dec. intervals)
2. Detailed solutions for each problem
3. Functions include trig, exponential, abs. value, logs

WEB ADDRESS: <http://archives.math.utk.edu/visual.calculus/3/graphing.5/index.html>

RESULT: Students will receive immediate feedback on a variety of first derivative problems.

15. UNIT III, INDICATOR 2

DESCRIPTION: Problem set of second derivative questions

FEATURES:

1. A 10-problem set of functions (find concavity intervals)
2. Detailed solutions for each problem
3. Functions include trig, exponential, abs. value, logs

WEB ADDRESS: <http://archives.math.utk.edu/visual.calculus/3/graphing.6/index.html>

RESULT: Students will receive immediate feedback on a variety of second derivative problems.

16. UNIT III, INDICATOR 2

DESCRIPTION: A set of graphical exercises tying together derivatives and properties of functions

FEATURES:

1. 10 exercises which have 10 questions each

2. Each exercises has a unique graph of a function f and is followed by 10 multiple choice questions
3. Questions deal with properties and the first and second derivatives of the function
4. Students receive feedback on responses

WEB ADDRESS: <http://archives.math.utk.edu/visual.calculus/3/graphing.1/index.html>

RESULT: Students will have extensive practice examining graphs and thinking about aspects of the graph's derivatives.

17. UNIT III, INDICATOR 2

DESCRIPTION: Page is a quiz on identifying graphs as either the graph of a function, its derivatives, or its second derivative

- FEATURES:**
1. Variety of graphs make for challenging problems
 2. Problems are not always given in the same order
 3. Immediate feedback on answers

WEB ADDRESS: <http://archives.math.utk.edu/visual.calculus/3/graphing.3/index.html>

RESULT: Students will have an opportunity to practice using their knowledge of properties of functions as they relate to derivatives.

18. UNIT III, INDICATOR 5

DESCRIPTION: Problem set regarding finding maximum and minimum values for functions on closed intervals

- FEATURES:**
1. A 10-problem set of max/min problems
Includes trig, exponential, logarithmic, etc.
 2. Detailed solutions for each problem

WEB ADDRESS: <http://archives.math.utk.edu/visual.calculus/3/max.1/index.html>

RESULT: Students will practice finding max/min values on a variety of challenging problems

19. UNIT III, INDICATOR 6

DESCRIPTION: Problem set of Mean Value Theorem questions

- FEATURES:**
1. A 10-problem set of functions and intervals
 2. Detailed solutions for each problem

WEB ADDRESS: <http://archives.math.utk.edu/visual.calculus/3/mvt.1/>

RESULT: Students will receive immediate feedback on a variety of M.V.T. problems.

20. UNIT III, INDICATOR 7

DESCRIPTION: Problem set of L'Hopital's Rule problems with finite values

FEATURES:

1. A 10-problem set of limits
2. Detailed solutions for each problem

WEB ADDRESS: <http://archives.math.utk.edu/visual.calculus/3/lhospital.1/index.html>

RESULT: Students will receive immediate feedback on a variety of L'Hopital's Rule problems.

21. UNIT III, INDICATOR 7

DESCRIPTION: Problem set of L'Hopital's Rule problems with infinite values

FEATURES:

1. A 10-problem set of limits
2. Detailed solutions for each problem

WEB ADDRESS: <http://archives.math.utk.edu/visual.calculus/3/lhospital.2/index.html>

RESULT: Students will receive immediate feedback on a variety of L'Hopital's Rule problems.

22. UNIT IV, INDICATOR 4

DESCRIPTION: Problem set of indefinite integrals using substitution

FEATURES:

1. A 10-problem set of integrals
2. Detailed hints and solutions for each problem
3. Integrals include trig, exponential and basic functions

WEB ADDRESS: <http://archives.math.utk.edu/visual.calculus/4/substitutions.1/index.html>

RESULT: Students will receive immediate feedback on substitution problems

23. UNIT IV, INDICATORS 3 - 5

DESCRIPTION: Quiz on integration, covers basic and by substitution

FEATURES:

1. A 50-problem quiz on indefinite integrals
2. Immediate feedback on answers with detailed solutions

WEB ADDRESS: <http://archives.math.utk.edu/visual.calculus/4/integrals.2/index.html>

RESULT: Students will receive practice and immediate feedback on a variety of integration problems.

24. UNIT V, INDICATOR 1

DESCRIPTION: Problem set of area between two curves integrals

FEATURES:

1. A 10-problem set of area questions
2. Detailed solutions for each problem

WEB ADDRESS:
<http://archives.math.utk.edu/visual.calculus/5/area2curves.2/index.html>

RESULT: Students will receive immediate feedback on area problems

25. UNIT VI, INDICATOR 2

DESCRIPTION: Problem set of integrals needing integration by parts

FEATURES:

1. A 10-problem set of integrals
2. Detailed hints and solutions for each problem

WEB ADDRESS:
http://archives.math.utk.edu/visual.calculus/4/int_by_parts.1/index.html

RESULT: Students will receive immediate feedback on a variety of integration by parts problems.

26. UNIT VI, INDICATOR 3

DESCRIPTION: Problem set of integration by partial fractions questions

FEATURES:

1. A 10-problem set of integrals
2. Detailed hints and solutions for each problem

WEB ADDRESS:
http://archives.math.utk.edu/visual.calculus/4/partial_fractions.1/index.html

RESULT: Students will receive immediate feedback on a variety of integration by parts problems.

27. UNIT VI, INDICATOR 5

DESCRIPTION: Problem set of improper integrals

FEATURES:

1. A 10-problem set of improper integrals
2. Detailed solutions for each problem

WEB ADDRESS:

<http://archives.math.utk.edu/visual.calculus/4/improper.1/index.html>

RESULT: Students will receive immediate feedback on improper integrals

28. UNIT VII, INDICATOR 7 b

DESCRIPTION: Problem set of convergence of series questions

FEATURES:

1. A 10-problem set of series
2. Detailed solutions for each problem

WEB ADDRESS:

<http://archives.math.utk.edu/visual.calculus/6/series.15/index.html>

RESULT: Students will practice determining the convergence of series

29. UNIT VII, INDICATOR 7 d

DESCRIPTION: Problem set using the integral test to determine convergence

FEATURES:

1. A 10-problem set of series
2. Detailed solutions for each problem

WEB ADDRESS:

<http://archives.math.utk.edu/visual.calculus/6/series.17/index.html>

RESULT: Students will practice using the integral test to determine the convergence of a series

30. UNIT VII, INDICATOR 7 e

DESCRIPTION: Problem set using the limit comparison test to determine the convergence of series

- FEATURES:**
1. A 10-problem set of series
 2. Detailed solutions for each problem

WEB ADDRESS:
<http://archives.math.utk.edu/visual.calculus/6/series.14/index.html>

RESULT: Students will practice using the limit comparison Test to determine the convergence of a series

31. UNIT VII, INDICATOR 7 f

DESCRIPTION: Problem set using the ratio test to determine convergence of a series

- FEATURES:**
1. A 10-problem set of series
 2. Detailed solutions for each problem

WEB ADDRESS:
<http://archives.math.utk.edu/visual.calculus/6/series.13/index.html>

RESULT: Students will practice using the ratio test to determine the convergence of series

32. UNIT VII, INDICATOR 7 g

DESCRIPTION: Problem set using the alternating series test to determine the convergence of series

- FEATURES:**
1. A 10-problem set of series
 2. Detailed solutions for each problem

WEB ADDRESS:
<http://archives.math.utk.edu/visual.calculus/6/series.16/index.html>

RESULT: Students will practice using the alternating series test to determine the convergence of a series

Section II: The following pages are sites that have calculus resources. The address is given along with a brief description of the site and possible uses in the classroom.

<http://barzilai.org/archive>

Site features interesting in-class activities correlated to the sections of the Stewart calculus book. Also includes projects and links to other resources.

<http://www.math.com/teachers/centers/lesson%20plans.html>

Site has links to different teacher-oriented math sites. Not a lot of calculus resources here.

<http://www.math.odu.edu/cbii/calcanim/>

Site shows demonstrations of a variety of calculus and precalculus concepts. Has good demonstrations which include convergence of series, arc length calculation, slopes, limits, parametrics, etc. Good calculus resource for illustrating certain concepts through visualization.

<http://archives.math.utk.edu/visual.calculus/>

Home page of the site referenced in section I. Besides the many drill and practice applications, site also has tutorials and demonstrations, but many of them require specific web plug-ins that may or may not be on school-based networks. Check with network administrators before planning to show these in your class.

<http://www.math.psu.edu/dna/graphics.html>

Site has graphical demonstrations of calculus concepts. A few of the demonstrations are useful in the calculus classroom.

<http://www.netsrq.com/~hahn/calculus.html>

A table of contents of calculus topics with anecdotal problems representing a variety of topics in the curriculum. Problems start with limits and continue through the beginning of integration.

<http://falcon.jmu.edu/~ramseyil/calculus.htm>

Site is an annotated index of websites which have calculus resources.

http://www.zapme.net/net/class/mathematics/calculus_basic.html

Site is a short listing of calculus resource sites.

<http://www.mathcs.nebrweslevan.edu/~glarose/classes/calc/calcprojects.html>

A listing of different calculus projects assigned by a college professor.

<http://www.integrals.com>

Site computes indefinite integrals and offers some insights including the history of integration.

<http://www.seresc.k12.nh.us/www/alvirne.html>

Site has good AP Calculus resources including: previous year's AP free response problems and solutions, problems of the week (archives), AP style questions, etc.

<http://www.hofstra.edu/~matscw/RealWorld/index.html>

Site has links to other calculus resources at Hofstra and also contains links to self-quizzes and review exercises similar to those found in the University of Tennessee site.

<http://www.math.odu.edu/~bogacki/citat/>

Site features an interactive series tutorial that has excellent explanations of problems dealing with convergence and divergence of series. Site also has a test on integration.

<http://library.thinkquest.org/3616/Calc/S3/TDM.html>

Site shows a demonstration of the disc method for finding volume of a solid. Good animation of the disc method.