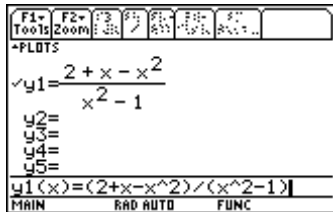
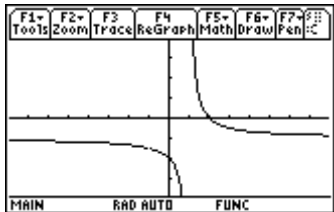
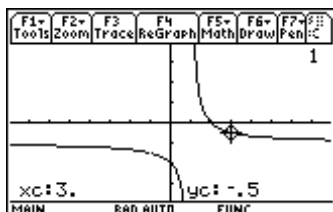
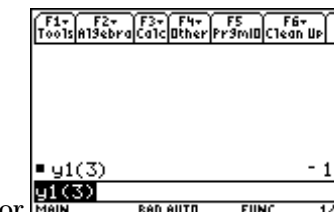


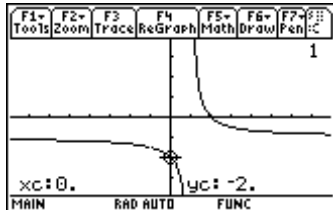
# EXPLORATIONS

## Appendix D

### Solutions to the Exercises

#### Chapter 1

- 

- 


OR
- 

4.

Zero  
xc:2. yc:0.

5.

$y_1 = \frac{2+x-x^2}{x^2-1}$   
 $y_2 = 3$   
 Intersection  
 xc:1.25 yc:3.

Intersection  
 xc:1.25 yc:3.

6.

TABLE SETUP  
 tblStart: -3  
 deltaTbl: 1  
 Graph <-> Table: OFF  
 Independent: AUTO  
 <Enter>=SAVE    <ESC>=CANCEL

x	y1
-3.	-1.25
-2.	-1.333
-1.	undef
0.	-2.
1.	undef

x=-3.

x	y1
-1.	undef
0.	-2.
1.	undef
2.	0.
3.	-0.5

x=3.

7.

$\lim_{x \rightarrow -1} y_1(x) = -3/2$   
 Limit(y1(x), x, -1)

8.

$\lim_{x \rightarrow 1} y_1(x) = \text{undef}$   
 $\lim_{x \rightarrow 1^+} y_1(x) = \infty$   
 $\lim_{x \rightarrow 1^-} y_1(x) = -\infty$   
 Limit(y1(x), x, 1, -1)

9.

$\lim_{x \rightarrow \infty} y_1(x) = -1$   
 $\lim_{x \rightarrow -\infty} y_1(x) = -1$   
 Limit(y1(x), x, -inf)

## Chapter 2

Results are shown with **Display Digits = FLOAT 10**.

- |              |                |             |              |               |                 |
|--------------|----------------|-------------|--------------|---------------|-----------------|
| F1-<br>Tools | F2-<br>Algebra | F3-<br>Calc | F4-<br>Other | F5-<br>Pr3mID | F6-<br>Clean Up |
|--------------|----------------|-------------|--------------|---------------|-----------------|

Define  $f(x) = \sqrt{x^2 + 4 \cdot x}$  Done

avgRC(f(x), x) | x = 2  
1.154652442

avgRC(f(x), x) | x = 2

F1- Tools	F2- Algebra	F3- Calc	F4- Other	F5- Pr3mID	F6- Clean Up
--------------	----------------	-------------	--------------	---------------	-----------------

Done

avgRC(f(x), x) | x = 2  
1.154652442

avgRC(f(x), x, 1.E-4) | x = 2  
1.154695727

avgRC(f(x), x, .0001) | x = 2
- |              |                |             |              |               |                 |
|--------------|----------------|-------------|--------------|---------------|-----------------|
| F1-<br>Tools | F2-<br>Algebra | F3-<br>Calc | F4-<br>Other | F5-<br>Pr3mID | F6-<br>Clean Up |
|--------------|----------------|-------------|--------------|---------------|-----------------|

nDeriv(f(x), x) | x = 2  
1.154700554

nDeriv(f(x), x, 1.E-4) | x = 2  
1.154700539

nDeriv(f(x), x, 1.E-4) | x = 2
- |              |                |             |              |               |                 |
|--------------|----------------|-------------|--------------|---------------|-----------------|
| F1-<br>Tools | F2-<br>Algebra | F3-<br>Calc | F4-<br>Other | F5-<br>Pr3mID | F6-<br>Clean Up |
|--------------|----------------|-------------|--------------|---------------|-----------------|

lim avgRC(f(x), x, h) | x = 2  
h → 0

$$\frac{2 \cdot \sqrt{3}}{3}$$

avgRC(f(x), x, h), h, 0 | x = 2
- |              |                |             |              |               |                 |
|--------------|----------------|-------------|--------------|---------------|-----------------|
| F1-<br>Tools | F2-<br>Algebra | F3-<br>Calc | F4-<br>Other | F5-<br>Pr3mID | F6-<br>Clean Up |
|--------------|----------------|-------------|--------------|---------------|-----------------|

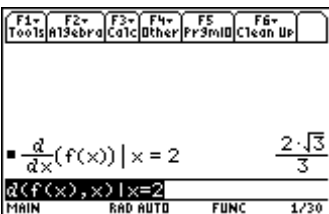
lim avgRC(f(x), x, h)  
h → 0

$$\frac{x + 2}{\sqrt{x \cdot (x + 4)}}$$

avgRC(f(x), x, h), h, 0
- |              |                |             |              |               |                 |
|--------------|----------------|-------------|--------------|---------------|-----------------|
| F1-<br>Tools | F2-<br>Algebra | F3-<br>Calc | F4-<br>Other | F5-<br>Pr3mID | F6-<br>Clean Up |
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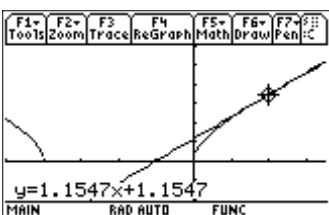
$\frac{d}{dx}(f(x))$   $\frac{x + 2}{\sqrt{x \cdot (x + 4)}}$

d(f(x), x)

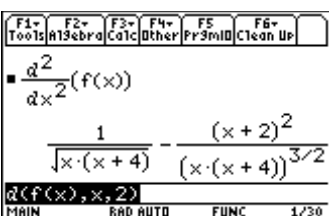
6. 

$$\frac{d}{dx}(f(x)) \Big|_{x=2} = \frac{2\sqrt{3}}{3}$$

$$d(f(x), x) \Big|_{x=2}$$

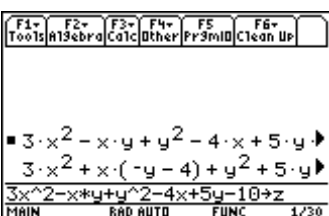
7. 

$$y = 1.1547x + 1.1547$$

8. 

$$\frac{d^2}{dx^2}(f(x)) = \frac{1}{\sqrt{x \cdot (x+4)}} - \frac{(x+2)^2}{(x \cdot (x+4))^{3/2}}$$

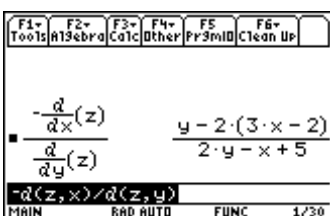
$$d^2(f(x), x, 2)$$

9. 

$$3x^2 - xy + y^2 - 4x + 5y$$

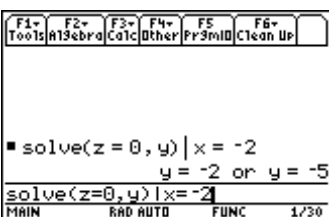
$$\frac{\partial}{\partial x}(3x^2 - xy + y^2 - 4x + 5y) = 6x - y - 4$$

$$\frac{\partial}{\partial y}(3x^2 - xy + y^2 - 4x + 5y) = -x + 2y + 5$$



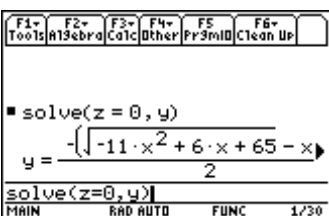
$$-\frac{d}{dx}(z) = \frac{y - 2 \cdot (3x - 2)}{2}$$

$$-\frac{d}{dy}(z) = \frac{y - 2 \cdot (3x - 2)}{2}$$

10. 

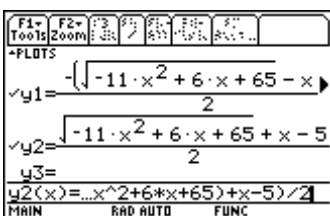
$$\text{solve}(z=0, y) \Big|_{x=-2}$$

$$y = -2 \text{ or } y = -5$$

11. 

$$\text{solve}(z=0, y)$$

$$y = \frac{-\sqrt{-11x^2 + 6x + 65} - x}{2}$$



$$y_1 = \frac{-\sqrt{-11x^2 + 6x + 65} - x}{2}$$

$$y_2 = \frac{\sqrt{-11x^2 + 6x + 65} + x - 5}{2}$$

$$y_3 = \frac{\sqrt{-11x^2 + 6x + 65} + x - 5}{2}$$

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>F1- Tools</td> <td>F2- Algebra</td> <td>F3- Calc</td> <td>F4- Other</td> <td>F5- Pr3mID</td> <td>F6- Clean Up</td> </tr> <tr> <td colspan="6" style="text-align: center;"> <math>\frac{d}{dx} \left( \frac{y-2(3x-2)}{2y-x+5} \right)</math> </td> </tr> <tr> <td colspan="6" style="text-align: center;"> <math>\frac{d}{dy} (z)</math> </td> </tr> <tr> <td colspan="6" style="text-align: center;"> <math>\frac{y-2(3x-2)}{2y-x+5}   x = -2 \text{ and } \blacktriangleright</math> </td> </tr> <tr> <td colspan="6" style="text-align: center;"> <math>-11/3</math> </td> </tr> <tr> <td colspan="6" style="text-align: center;"> <math>\frac{d}{dx} (2y-x+5)   x = -2 \text{ and } y = -5</math> </td> </tr> <tr> <td>MAIN</td> <td>RAD</td> <td>AUTO</td> <td>FUNC</td> <td colspan="2" style="text-align: right;">2/30</td> </tr> </table>	F1- Tools	F2- Algebra	F3- Calc	F4- Other	F5- Pr3mID	F6- Clean Up	$\frac{d}{dx} \left( \frac{y-2(3x-2)}{2y-x+5} \right)$						$\frac{d}{dy} (z)$						$\frac{y-2(3x-2)}{2y-x+5}   x = -2 \text{ and } \blacktriangleright$						$-11/3$						$\frac{d}{dx} (2y-x+5)   x = -2 \text{ and } y = -5$						MAIN	RAD	AUTO	FUNC	2/30		OR	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>F1- Tools</td> <td>F2- Zoom</td> <td>F3- Trace</td> <td>F4- ReGraph</td> <td>F5- Math</td> <td>F6- Draw</td> <td>F7- Pen</td> <td>F8- C</td> </tr> <tr> <td colspan="8" style="text-align: center;"> </td> </tr> <tr> <td colspan="8" style="text-align: center;"> <math>dy/dx = -3.666667</math> </td> </tr> <tr> <td>MAIN</td> <td>RAD</td> <td>AUTO</td> <td>FUNC</td> <td colspan="4"></td> </tr> </table>	F1- Tools	F2- Zoom	F3- Trace	F4- ReGraph	F5- Math	F6- Draw	F7- Pen	F8- C									$dy/dx = -3.666667$								MAIN	RAD	AUTO	FUNC				
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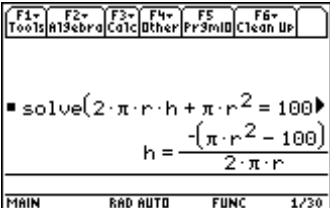
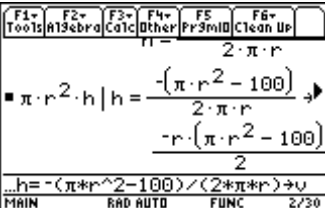
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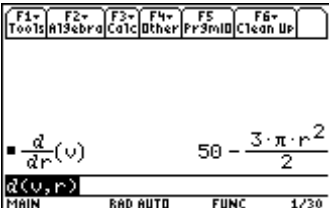
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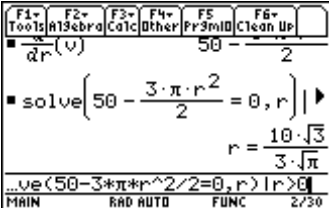
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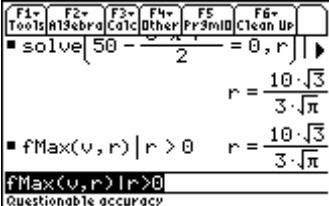
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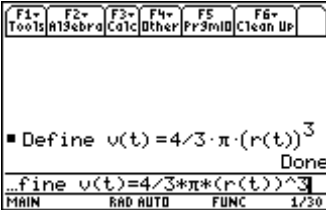
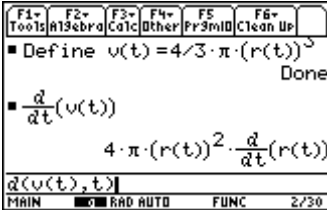
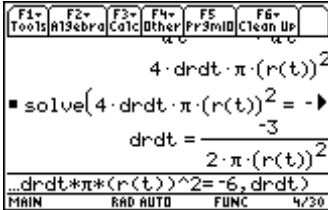
### Chapter 3

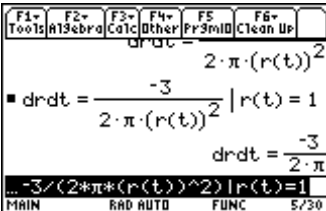
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2. 

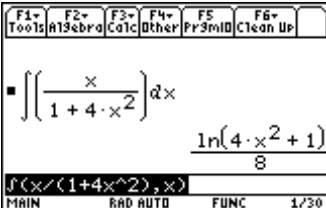
3. 

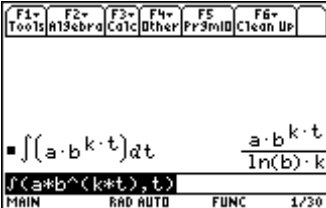
4. 

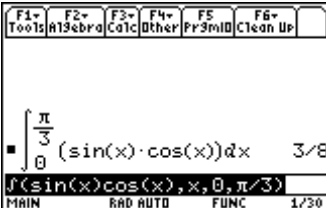
5.   

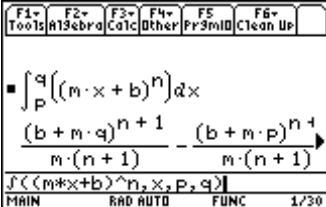
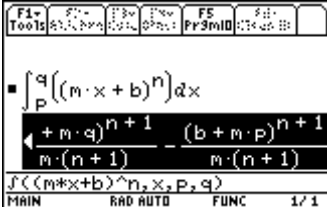
6. 

### Chapter 4

1. 

2. 

3. 

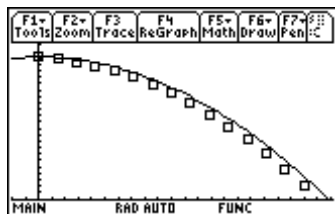
4.  

## Chapter 5

1.  $\text{lram} = 4.9375$ ,  $\text{rram} = 6.4375$ ,  $\text{mram} = 5.65625$
2. Same as Exercise 1.
3.  $\text{lram} = \text{rram} = \text{mram} = 17/3$
4. Same as Exercise 3.
5.  $\text{lram} = \frac{\pi}{4}$ ,  $\text{rram} = -\frac{\pi}{4}$ ,  $\text{mram} = 0$
6.  $\text{lram}$  and  $\text{rram}$  same as Exercise 5;  $\text{mram} = 2.356\text{E-}14$  (in APPROXIMATE Mode)
7. The TI-89 cannot evaluate these limits.
8. 0

## Chapter 6

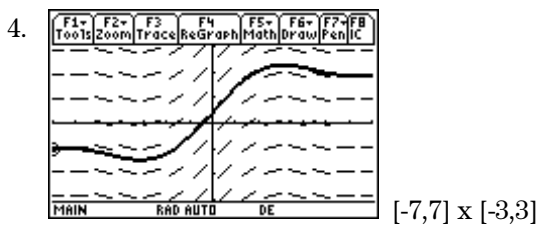
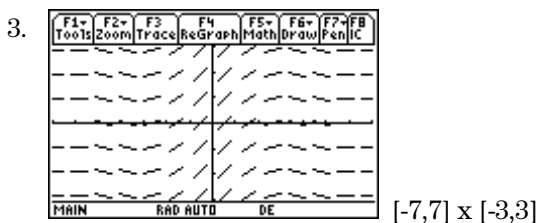
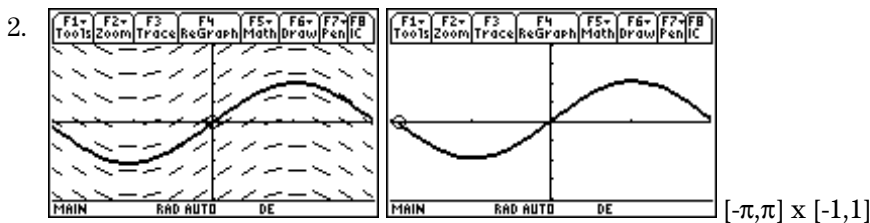
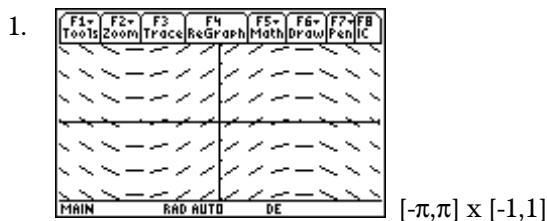
1. .9471
2. 3.8202
3.  $y = 2x\cos(x) + (x^2 - 2)\sin(x)$
4.  $v = v_0 e^{-\frac{kt}{m}}$
5.  $y = 19 - 16t^2$
6.  $q = \left( \frac{-\cos(t)}{2} - \frac{\sin(t)}{2} \right) e^{-t} + \frac{1}{2}$
7. (a)  $y = .8649 - 4.9t^2$



8. About  $47^\circ\text{C}$
9. About 15.7 seconds
10. About 18 days

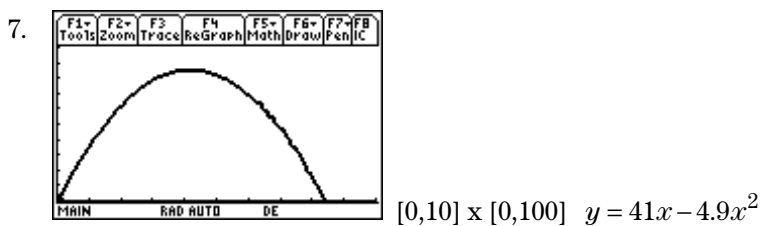


### Chapter 7

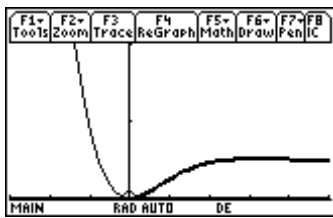


5. 5700 years

6. about 13,200 years



8.



$[-3, 5] \times [0, 2]$

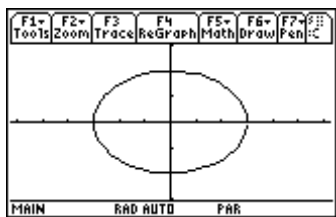
$$y = \left( \frac{-\cos x}{2} - \frac{\sin x}{2} \right) e^{-x} + \frac{1}{2}$$

9. About 379 feet

10. No

### Chapter 8

1.



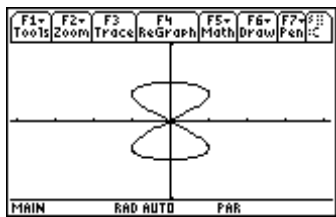
(a)

(b) .667

(c)  $-\frac{2}{3}$

(d) 15.8654

2.



(a)

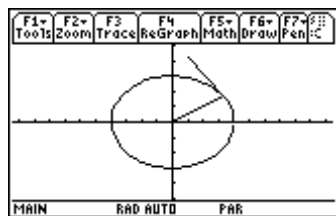
(b) 0

(c) 0

(d) 9.42943

3. About 389 feet

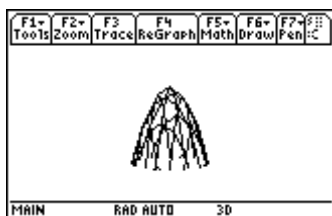
4.



5.

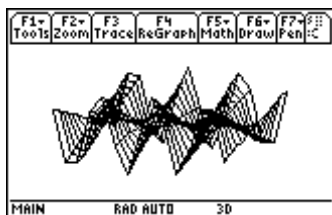
1.921

6.



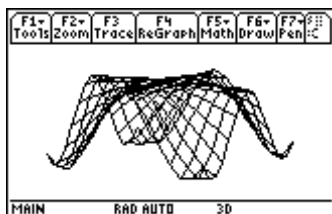
(a)

standard window



(b)

standard window



(c)

[-2,2] x [-2,2] x [-1,1]

## Chapter 9

1. Converges to 0.
2. Converges to 0.
3. Diverges.
4. Converges to -0.693 ( $\ln(1/2)$ ).
5. Converges to 2.718 ( $e$ ).
6. Converges to 3.141 ( $\pi$ ).
7. Converges to 2.
8. Diverges.

$$9. \frac{x^8}{315} - \frac{2x^6}{45} + \frac{x^4}{3} - x^2 + 1$$

10. Same result as Exercise 9.

$$11. \frac{(x-1)^5}{5} - \frac{(x-1)^4}{4} + \frac{(x-1)^3}{3} - \frac{(x-1)^2}{2} + (x-1)$$

$$12. \frac{(2x-\pi)^4}{384} - \frac{(2x-\pi)^2}{8} + 1$$

