Principles of Calculus Modeling: An Interactive Approach by Donald Kreider, Dwight Lahr, and Susan Diesel
Exercises for Section 1.1

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1. (1 pt)
Calculate a few values to determine which image shows the graph of the function $4x-3$.

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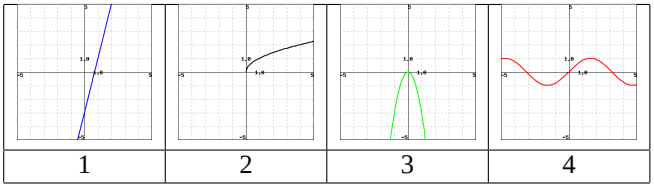

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2. (1 pt)
Calculate a few values to determine which image shows the graph of the function $-x+4$.

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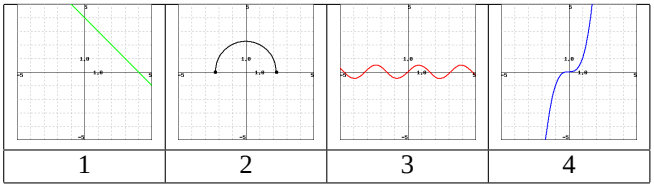

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3. (1 pt)
Consider the following table of times and distances for a dropped object.

time (x)	distance (y)
0	0
0.2	0.08
0.4	0.32
0.6	???
0.8	1.28
1	2

If you assume the data points are modeled by a function of the form $y = ax^2 + c$, which of the following values is most likely as the missing value in the table?

—

A. 0.08
B. 0.72
C. 7.2
D. 0
E. -0.72

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4. (1 pt)
Consider the following table of times and distances for a dropped object.

time (x)	distance (y)
0	1
3	-53
6	-431
9	???
12	-3455
15	-6749

If you assume the data points are modeled by a function of the form $y = ax^3 + c$, which of the following values is most likely as the missing value in the table?

—

A. -6749
B. -53
C. 1457
D. 0
E. -1457

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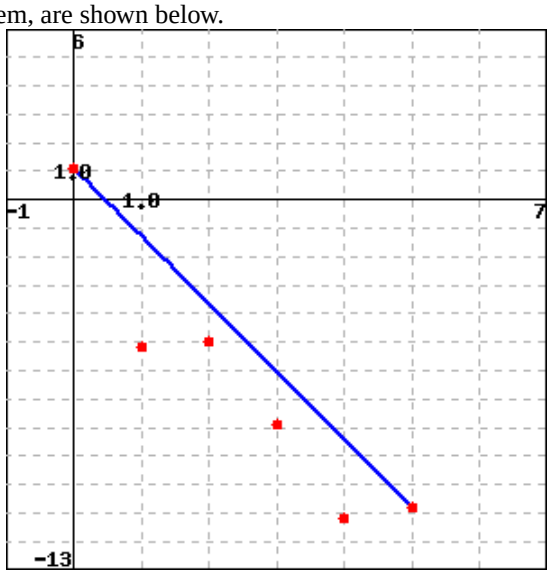
5. (1 pt)
Consider a table of data.

x	y
0	1.1
1	-5.2
2	-5.0
3	-7.9
4	-11.2
5	-10.8

The data points in the table, and a line $L(x)$ passing among them, are shown below.



Assume the line passes through points (0, 1.1) and (5, -10.8).
Compute the sum of squared errors $\sum_{i=0}^{5}(y_i - L(x_i))^2$.

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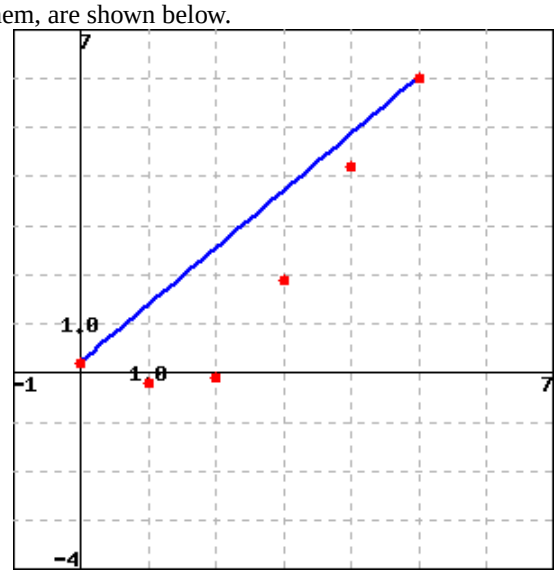
6. (1 pt)
Consider a table of data.

x	y
0	0.2
1	-0.2
2	-0.1
3	1.9
4	4.2
5	6.0

The data points in the table, and a line $L(x)$ passing among them, are shown below.



Assume the line passes through points (0, 0.2) and (5, 6.0). Compute the sum of squared errors $\sum_{i=0}^{5}(y_i - L(x_i))^2$.
_____

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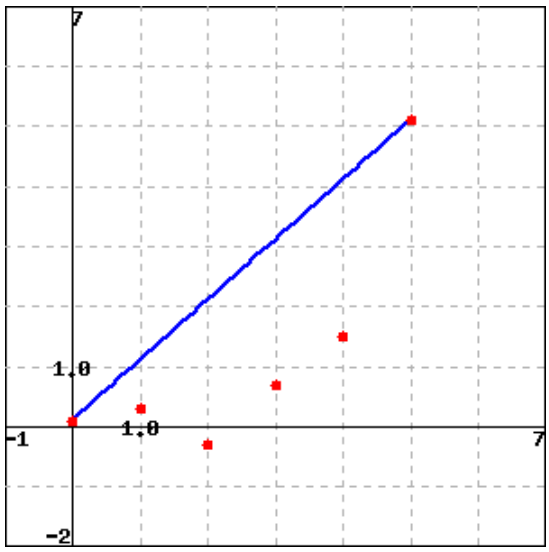
7. (1 pt)
Consider a table of data.

x	y
0	0.1
1	0.3
2	-0.3
3	0.7
4	1.5
5	5.1

The data points in the table, and a line $L(x)$ passing among them, are shown below.



Assume the line passes through points (0, 0.1) and (5, 5.1). Compute the sum of squared errors $\sum_{i=0}^{5}(y_i - L(x_i))^2$.
_____

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8. (1 pt)
Let $f(x) = -3\sin(8x) - 1$. Compute $f(x)$ for the following values. If $f(x)$ cannot be evaluated, enter **no answer**, without quotes.

$f(0) =$ _____
$f(-1) =$ _____
$f(1) =$ _____
$f(\sqrt{2}) =$ _____
$f(e) =$ _____

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9. (1 pt)
Let $f(x) = -7\dfrac{\sqrt{10-x}}{x^2}$. Compute $f(x)$ for the following values. If $f(x)$ cannot be evaluated, enter **no answer**, without quotes.

$f(0) =$ _____
$f(-1) =$ _____
$f(13) =$ _____
$f(\sqrt{2}) =$ _____
$f(e) =$ _____

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10. (1 pt)
Let $f(x) = 8x^2 + 4x + 2$. Compute $f(x)$ for the following values. If $f(x)$ cannot be evaluated, enter **no answer**, without quotes.

$f(0) =$ _____
$f(-1) =$ _____
$f(9) =$ _____
$f(\sqrt{2}) =$ _____
$f(e) =$ _____

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11. (1 pt)
Consider the following table of data values.

x	y
3	18
6	43
9	90
12	154
15	233
18	333

Which of the following functions best fits the data given in the table?

—

A. $y = 3x^2 + 3$
B. $y = 2x^2 + 7$
C. $y = 1x^2 + 9$
D. $y = 11$

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12. (1 pt)
Consider the following table of points.

x	y
0	7.5
1	14
2	33.5
3	66

If the points in the table are on a curve of the form $y = ax^2 + c$, then what are the values of a and c?
a = _____
c = _____

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13. (1 pt)
Consider the following table of data values.

x	y
0	10
2	16
4	22
6	18

For each of the following lines $y = mx + b$, calculate the sum of squared errors $\sum_{i=0}^{3}(y_i - (mx_i + b))^2$.

$y = 3x + 10$
Sum of squared errors: _____

$y = 3x + 6$
Sum of squared errors: _____

$y = 1x + 8$
Sum of squared errors: _____

According to the values you just computed, which of the following lines best fits the data?

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A. $y = 3x + 10$
B. $y = 3x + 6$
C. $y = 1x + 8$

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14. (1 pt)
Consider the following table of points.

x	y
0	17.00
1.5	-3.92
3	-150.40
4.5	-547.98
6	-1322.20
7.5	-2598.62

If the points in the table are on a curve of the form $y = ax^3 + c$, then what are the values of a and c?
a = _____
c = _____

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15. (1 pt)
Consider the following table of data values.

x	y
0	19
4.2	76.74
8.4	267.96
12.6	580.66

For each of the following functions $y = ax^2 + c$, calculate the sum of squared errors $\sum_{i=0}^{3}(y_i - (ax_i^2 + c))^2$.

$y = 4.5x^2 + 19$
Sum of squared errors: _____

$y = 3.5x^2 + 15$
Sum of squared errors: _____

$y = 2.5x^2 + 17$
Sum of squared errors: _____

According to the values you just computed, which of the following functions best fits the data?

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A. $y = 4.5x^2 + 19$
B. $y = 3.5x^2 + 15$
C. $y = 2.5x^2 + 17$