1. The table shows the growth of a certain bacteria.

| **Time in Hours, $t$** | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| **Number of Cells, $N$** | 50 | 71 | 100 | 141 | 200 | 283 |

If $N$ represents the number of cells at time $t$, which equation ***best*** models this set of data?

A $N = 45.51x + 27.05$

B $N = 27.05x + 45.51$

C $N = (1.41)(50.06)^x$

D $N = (50.06)(1.41)^x$

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2. The table shows the number of households with a telephone answering machine in selected years after 1980.

| **Years after 1980** ($x$) | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
|---|---|---|---|---|---|---|---|---|
| **Number of Households with Answering Machines** | 8.7 | 10.8 | 13.0 | 16.0 | 21.0 | 30.0 | 37.5 | 43.8 |

Using the data points, which quadratic equation ***best*** models this set of data?

A $y = 8.4x^2 - 0.6x + 7.3$

B $y = 0.15x^2 - 0.74x + 9.25$

C $y = 0.2x^2 - 1.5x + 12$

D $y = {}^{-}0.008x^2 + 0.79x - 1.39$

3. The table shows the relationship between calories and fat grams contained in orders of fried chicken from various restaurants.

| **Calories** | 305 | 410 | 320 | 500 | 510 | 440 |
|---|---|---|---|---|---|---|
| **Fat Grams** | 28 | 34 | 28 | 41 | 42 | 38 |

Assuming the data can best be described by a linear model, how many fat grams would be expected to be contained in a 275-calorie order of fried chicken?

A 28 grams

B 27 grams

C 25 grams

D 22 grams

---

4. The table below shows the number of doctors in Bingham City from 1960 to 1986.

| **Year** | 1960 | 1967 | 1970 | 1975 | 1982 | 1985 | 1986 |
|---|---|---|---|---|---|---|---|
| **Number of Doctors** | 2,937 | 3,511 | 3,754 | 4,173 | 4,741 | 5,019 | 5,102 |

If a linear regression model is fit to this data, which statement would ***best*** describe the model (let $x = 0$ for 1960)?

A The equation $y = 1.01x - 3{,}500$ is the line of best fit for this data, showing that the number of new doctors in Bingham City has increased by 1% each year.

B The equation $y = 82x + 2{,}937$ is the line of best fit for this data, showing that approximately 82 new doctors came to Bingham City over the 26-year period.

C The equation $y = 83x + 2{,}929$ is the line of best fit for this data, showing that the number of new doctors in Bingham City has increased by 83% over the 26-year period.

D The equation $y = 83x + 2{,}929$ is the line of best fit for this data, showing that the number of doctors in Bingham City increased, on average, by 83 each year.

5. Which function models the population of Ethiopia from 1940 to 2000 (let $x = 0$ in 1940)?

| **Year** | **Population of Ethiopia** (in millions) |
|---|---|
| 1940 | 16 |
| 1950 | 20 |
| 1960 | 25 |
| 1970 | 31 |
| 1980 | 39 |
| 1990 | 50 |
| 2000 | 64 |

A $f(x) = 0.01x^2 + 0.179x + 16.6$

B $f(x) = 0.01x^2 + 0.181x + 15.9$

C $f(x) = 15.82(1.023)^x$

D $f(x) = 16(1.02)^x$

6. A medicine contains 400 units of an antibiotic per milliliter. The medicine decomposes over time. The decomposition process is summarized in the table.

| **Days** ($d$) | 3 | 6 | 7 | 9 | 11 | 13 | 18 |
|---|---|---|---|---|---|---|---|
| **Units of Antibiotic** ($a$) (per milliliter) | 380.1 | 361.2 | 355.1 | 343.3 | 331.8 | 320.7 | 294.6 |

Which equation is the ***best*** model for this data?

A $a = 400(0.9832)^d$

B $a = 380.1(0.9915)^d$

C $a = 380.1(0.985)^d$

D $a = 391.5(0.985)^d$

7. The table shows the number (in millions) of Hispanic-American citizens of voting age in certain congressional election years.

| **Year** | **Hispanic-American Voters** (in millions) |
|---|---|
| 1978 | 6.8 |
| 1980 | 8.2 |
| 1982 | 9.6 |
| 1984 | 11.0 |
| 1986 | 12.4 |
| 1988 | 13.8 |
| 1990 | 15.2 |
| 1992 | 16.6 |
| 1994 | 18.0 |

Which of the following ***best*** models the relationship of the data?

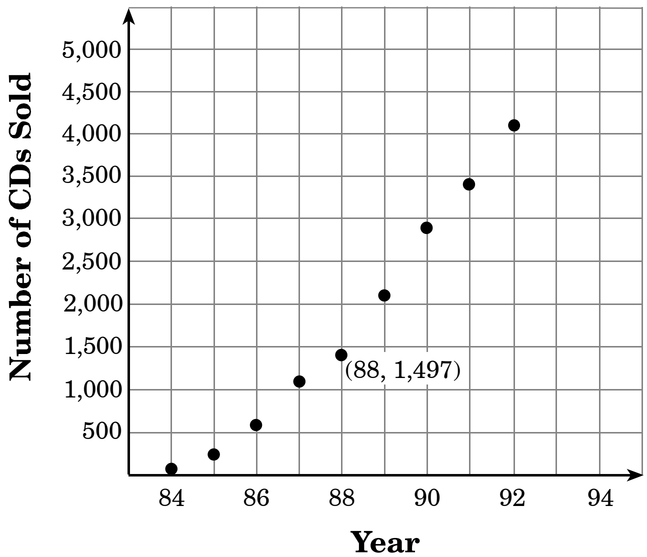
A a linear model

B a quadratic model

C a cubic model

D an exponential model

8. The graph shows a scatter plot of the number of compact discs (CDs) sold at a music store during part of the 1980s and early 1990s. An equation for the line of best fit for the given data is $y = 518x - 43{,}886$.




What is the difference between the observed value and the predicted value at $x = 88$?

A 1,698

B 979

C 518

D 201

9. Mr. Jones bought a piece of property for \$25,000. If the property appreciates at a rate of 10% per year, what will be its ***approximate*** value in $7\frac{1}{2}$ years?

A \$53,000

B \$51,000

C \$44,000

D \$39,000

10. If a city's population growth rate is 7% per year (compounded annually), how long will it take the city's population to double?

A 3.86 years

B 9.90 years

C 10.24 years

D 26 years

11. The Wongs bought a new house three years ago for \$92,000. The house is now worth \$113,000. Assuming a steady annual percentage growth rate, ***approximately*** what was the yearly rate of appreciation?

A 7.1%

B 18.6%

C 22.8%

D 61%

12. Steven bought a car 6 years ago for \$11,500. He just sold it for \$5,400 and wants to buy a brand new car of the same model. This time he wants to make sure that when he resells it he gets back at least 75% of what he paid. Assuming that the depreciation rate remains unchanged, what is the ***longest*** amount of time Steven can drive the car before he should resell it?

A 6 months

B 2.0 years

C 2.2 years

D 2.8 years

13. Nagel's Bagel Shop makes a monthly report to summarize the cost of making a single bagel of each type and the price at which it is sold. Matrix $C$ represents cost, and matrix $P$ represents selling price.

$$C = \begin{array}{cccc} \text{Plain} & \text{Blueberry} & \text{Wheat} & \text{Onion} \\ \end{array} \atop \begin{bmatrix} 0.12 & 0.17 & 0.13 & 0.15 \end{bmatrix} \qquad P = \begin{array}{cccc} \text{Plain} & \text{Blueberry} & \text{Wheat} & \text{Onion} \\ \end{array} \atop \begin{bmatrix} 0.45 & 0.50 & 0.50 & 0.50 \end{bmatrix}$$

Which matrix represents the profit on a single bagel of each type?

A $\begin{array}{cccc} \text{Plain} & \text{Blueberry} & \text{Wheat} & \text{Onion} \end{array} \atop \begin{bmatrix} 0.57 & 0.67 & 0.63 & 0.65 \end{bmatrix}$

B $\begin{array}{cccc} \text{Plain} & \text{Blueberry} & \text{Wheat} & \text{Onion} \end{array} \atop \begin{bmatrix} 0.33 & 0.33 & 0.35 & 0.37 \end{bmatrix}$

C $\begin{array}{cccc} \text{Plain} & \text{Blueberry} & \text{Wheat} & \text{Onion} \end{array} \atop \begin{bmatrix} 0.33 & 0.33 & 0.33 & 0.33 \end{bmatrix}$

D $\begin{array}{cccc} \text{Plain} & \text{Blueberry} & \text{Wheat} & \text{Onion} \end{array} \atop \begin{bmatrix} 0.33 & 0.33 & 0.37 & 0.35 \end{bmatrix}$

14. The National Dairy Council charges each dairy an advertising fee for every gallon of milk sold. Matrix *A* shows the gallons of milk sold at Windsor Dairy over a two-week period. Matrix *B* shows the dollar amount per gallon.

| ***A*** = | **Gallons of Milk Sold** | | |
|---|---|---|---|
| | Whole | Low Fat | Skim |
| **Week 1** | 181 | 450 | 102 |
| **Week 2** | 194 | 530 | 127 |

| ***B*** = | **Dollar Amount per Gallon** | |
|---|---|---|
| | Revenues ($) | Advertising Fee ($) |
| **Whole** | 2.89 | 0.29 |
| **Low Fat** | 2.79 | 0.32 |
| **Skim** | 2.69 | 0.35 |

If matrix *C* is the product of *A* and *B*, which element in matrix *C* represents the total advertising fees for Week 1?

$$C = A \times B = \begin{bmatrix} c_{11} & c_{12} \\ c_{21} & c_{22} \end{bmatrix}$$

A $c_{11}$

B $c_{21}$

C $c_{12}$

D $c_{22}$

15. Two slices of pizza and one drink cost Mary Ann \$4.50. Three slices and two drinks cost Elmo \$7.25. Set up a matrix equation to find the cost of one slice of pizza ($x$) and one drink ($y$). What would be the inverse matrix that could be used to solve the equation?

A $A^{-1} = \begin{bmatrix} ^-1 & 1 \\ 2 & ^-1 \end{bmatrix}$

B $A^{-1} = \begin{bmatrix} 2 & ^-1 \\ ^-3 & 2 \end{bmatrix}$

C $A^{-1} = \begin{bmatrix} 1 & 2 \\ ^-1 & 3 \end{bmatrix}$

D $A^{-1} = \begin{bmatrix} 1 & ^-1 \\ ^-1 & 2 \end{bmatrix}$

16. Two slices of pizza and 3 cookies cost \$6. Three slices of pizza and 5 cookies cost \$8. Which equation could be used to find the individual costs of a slice of pizza ($x$) and a cookie ($y$)?

A $\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 & ^-3 \\ ^-3 & 2 \end{bmatrix} \begin{bmatrix} 6 \\ 8 \end{bmatrix}$

B $\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 6 \\ 8 \end{bmatrix} \begin{bmatrix} 5 & ^-3 \\ ^-3 & 2 \end{bmatrix}$

C $\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 2 & 3 \\ 3 & 5 \end{bmatrix} \begin{bmatrix} 6 \\ 8 \end{bmatrix}$

D $\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 6 \\ 8 \end{bmatrix} \begin{bmatrix} 2 & 3 \\ 3 & 5 \end{bmatrix}$

## End of Goal 4 Sample Items

# Answers to EOC Algebra II Sample Items

## Goal 4

1. **Objective 4.01**
   Write and interpret an equation of a curve (linear, exponential, quadratic) which models a set of data.
   **Thinking Skill:** Generating **Correct Answer:** D

2. **Objective 4.01**
   Write and interpret an equation of a curve (linear, exponential, quadratic) which models a set of data.
   **Thinking Skill:** Generating **Correct Answer:** B

3. **Objective 4.01**
   Write and interpret an equation of a curve (linear, exponential, quadratic) which models a set of data.
   **Thinking Skill:** Integrating **Correct Answer:** C

4. **Objective 4.01**
   Write and interpret an equation of a curve (linear, exponential, quadratic) which models a set of data.
   **Thinking Skill:** Generating **Correct Answer:** D

5. **Objective 4.02**
   Find the equation of the curve of best-fit (linear, exponential, quadratic) for a set of data. Interpret the constants, coefficients, and base in the context of the data. Check the equation for goodness-of-fit and use the equation for predictions.
   **Thinking Skill:** Generating **Correct Answer:** C

6. **Objective 4.02**
   Find the equation of the curve of best-fit (linear, exponential, quadratic) for a set of data. Interpret the constants, coefficients, and base in the context of the data. Check the equation for goodness-of-fit and use the equation for predictions.
   **Thinking Skill:** Generating **Correct Answer:** A

7. **Objective 4.02**
   Find the equation of the curve of best-fit (linear, exponential, quadratic) for a set of data. Interpret the constants, coefficients, and base in the context of the data. Check the equation for goodness-of-fit and use the equation for predictions.
   **Thinking Skill:** Integrating **Correct Answer:** A

8. **Objective 4.02**
   Find the equation of the curve of best-fit (linear, exponential, quadratic) for a set of data. Interpret the constants, coefficients, and base in the context of the data. Check the equation for goodness-of-fit and use the equation for predictions.
   **Thinking Skill:** Generating **Correct Answer:** D

## Goal 4

9. **Objective 4.03**
Use exponential equations of the form $f(x)=(1+r)^x$.
**Thinking Skill:** Applying **Correct Answer:** B

10. **Objective 4.03**
Use exponential equations of the form $f(x)=(1+r)^x$.
**Thinking Skill:** Integrating **Correct Answer:** C

11. **Objective 4.03**
Use exponential equations of the form $f(x)=(1+r)^x$.
**Thinking Skill:** Integrating **Correct Answer:** A

12. **Objective 4.03**
Use exponential equations of the form $f(x)=(1+r)^x$.
**Thinking Skill:** Integrating **Correct Answer:** C

13. **Objective 4.04**
Operate with matrices to solve problems. a) Add, subtract, and multiply matrices. b) Find the inverse and determinant of a matrix.
**Thinking Skill:** Analyzing **Correct Answer:** D

14. **Objective 4.04**
Operate with matrices to solve problems. a) Add, subtract, and multiply matrices. b) Find the inverse and determinant of a matrix.
**Thinking Skill:** Integrating **Correct Answer:** C

15. **Objective 4.04**
Operate with matrices to solve problems. a) Add, subtract, and multiply matrices. b) Find the inverse and determinant of a matrix.
**Thinking Skill:** Generating **Correct Answer:** B

16. **Objective 4.04**
Operate with matrices to solve problems. a) Add, subtract, and multiply matrices. b) Find the inverse and determinant of a matrix.
**Thinking Skill:** Generating **Correct Answer:** A