

Part I

Answer all 24 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For each statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. Record your answers on your separate answer sheet. [48]

Use this space for computations.

- 1 The number of bacteria grown in a lab can be modeled by $P(t) = 300 \cdot 2^{4t}$, where t is the number of hours. Which expression is equivalent to $P(t)$?

- (1) $300 \cdot 8^t$ (3) $300^t \cdot 2^4$
 (2) $300 \cdot 16^t$ (4) $300^{2t} \cdot 2^{2t}$

- 2 During physical education class, Andrew recorded the exercise times in minutes and heart rates in beats per minute (bpm) of four of his classmates. Which table best represents a linear model of exercise time and heart rate?

Student 1

Exercise Time (in minutes)	Heart Rate (bpm)
0	60
1	65
2	70
3	75
4	80

(1)

Student 3

Exercise Time (in minutes)	Heart Rate (bpm)
0	58
1	65
2	70
3	75
4	79

(3)

Student 2

Exercise Time (in minutes)	Heart Rate (bpm)
0	62
1	70
2	83
3	88
4	90

(2)

Student 4

Exercise Time (in minutes)	Heart Rate (bpm)
0	62
1	65
2	66
3	73
4	75

(4)

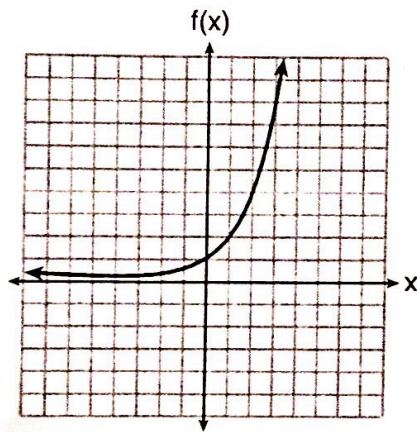
Use this space for computations.

- 10 Gretchen has \$50 that she can spend at the fair. Ride tickets cost \$1.25 each and game tickets cost \$2 each. She wants to go on a minimum of 10 rides and play at least 12 games.

Which system of inequalities represents this situation when r is the number of ride tickets purchased and g is the number of game tickets purchased?

- (1) $1.25r + 2g < 50$
 $r \leq 10$
 $g > 12$
- (2) $1.25r + 2g \leq 50$
 $r \geq 10$
 $g \geq 12$
- (3) $1.25r + 2g \leq 50$
 $r \geq 10$
 $g > 12$
- (4) $1.25r + 2g < 50$
 $r \leq 10$
 $g \geq 12$

- 11 Three functions are shown below.



$$g(x) = 3^x + 2$$

x	h(x)
-5	30
-4	14
-3	6
-2	2
-1	0
0	-1
1	-1.5
2	-1.75

Which statement is true?

- (1) The y -intercept for $h(x)$ is greater than the y -intercept for $f(x)$.
- (2) The y -intercept for $f(x)$ is greater than the y -intercept for $g(x)$.
- (3) The y -intercept for $h(x)$ is greater than the y -intercept for both $g(x)$ and $f(x)$.
- (4) The y -intercept for $g(x)$ is greater than the y -intercept for both $f(x)$ and $h(x)$.

Use this space for computations.

- 12 Olivia entered a baking contest. As part of the contest, she needs to demonstrate how to measure a gallon of milk if she only has a teaspoon measure. She converts the measurement using the ratios below:

$$\frac{4 \text{ quarts}}{1 \text{ gallon}} \cdot \frac{2 \text{ pints}}{1 \text{ quart}} \cdot \frac{2 \text{ cups}}{1 \text{ pint}} \cdot \frac{\frac{1}{4} \text{ cup}}{4 \text{ tablespoons}} \cdot \frac{3 \text{ teaspoons}}{1 \text{ tablespoon}}$$

Which ratio is *incorrectly* written in Olivia's conversion?

- (1) $\frac{4 \text{ quarts}}{1 \text{ gallon}}$ (3) $\frac{\frac{1}{4} \text{ cup}}{4 \text{ tablespoons}}$
(2) $\frac{2 \text{ pints}}{1 \text{ quart}}$ (4) $\frac{3 \text{ teaspoons}}{1 \text{ tablespoon}}$

- 13 If $y = 3x^3 + x^2 - 5$ and $z = x^2 - 12$, which polynomial is equivalent to $2(y + z)$?

- (1) $6x^3 + 4x^2 - 34$ (3) $6x^3 + 3x^2 - 22$
(2) $6x^3 + 3x^2 - 17$ (4) $6x^3 + 2x^2 - 17$

- 14 An outdoor club conducted a survey of its members. The members were asked to state their preference between skiing and snowboarding. Each member had to pick one. Of the 60 males, 45 stated they preferred to snowboard. Twenty-two of the 60 females preferred to ski. What is the relative frequency that a male prefers to ski?

- (1) 0.125 (3) $\overline{0.333}$
(2) 0.25 (4) $\overline{0.405}$

Use this space for computations.

15 When the function $g(x) = \begin{cases} 5x, & x \leq 3 \\ x^2 + 4, & x > 3 \end{cases}$ is graphed correctly, how should the points be drawn on the graph for an x -value of 3?

- (1) open circles at (3,15) and (3,13)
- (2) closed circles at (3,15) and (3,13)
- (3) an open circle at (3,15) and a closed circle at (3,13)
- (4) a closed circle at (3,15) and an open circle at (3,13)

16 If $f(x) = 2x^2 + x - 3$, which equation can be used to determine the zeros of the function?

- (1) $0 = (2x - 3)(x + 1)$
- (2) $0 = (2x + 3)(x - 1)$
- (3) $0 = 2x(x + 1) - 3$
- (4) $0 = 2x(x - 1) - 3(x + 1)$

17 Each day, a local dog shelter spends an average of \$2.40 on food per dog. The manager estimates the shelter's daily expenses, assuming there is at least one dog in the shelter, using the function $E(x) = 30 + 2.40x$.

Which statements regarding the function $E(x)$ are correct?

- I. x represents the number of dogs at the shelter per day.
- II. x represents the number of volunteers at the shelter per day.
- III. 30 represents the shelter's total expenses per day.
- IV. 30 represents the shelter's nonfood expenses per day.

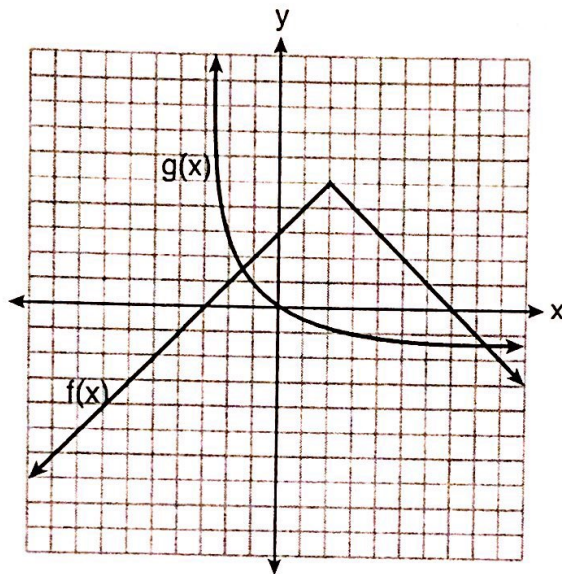
- (1) I and III
- (2) I and IV
- (3) II and III
- (4) II and IV

Use this space for computations.

18 Which point is *not* in the solution set of the equation $3y + 2 = x^2 - 5x + 17$?

- (1) $(-2, 10)$ (3) $(2, 3)$
(2) $(-1, 7)$ (4) $(5, 5)$

19 The functions $f(x)$ and $g(x)$ are graphed below.



Based on the graph, the solutions to the equation $f(x) = g(x)$ are

- (1) the x -intercepts
(2) the y -intercepts
(3) the x -values of the points of intersection
(4) the y -values of the points of intersection

20 For the sequence $-27, -12, 3, 18, \dots$, the expression that defines the n th term where $a_1 = -27$ is

- (1) $15 - 27n$ (3) $-27 + 15n$
(2) $15 - 27(n - 1)$ (4) $-27 + 15(n - 1)$

Use this space for computations.

21 The data obtained from a random sample of track athletes showed that as the foot size of the athlete decreased, the average running speed decreased. Which statement is best supported by the data?

- (1) Smaller foot sizes cause track athletes to run slower.
- (2) The sample of track athletes shows a causal relationship between foot size and running speed.
- (3) The sample of track athletes shows a correlation between foot size and running speed.
- (4) There is no correlation between foot size and running speed in track athletes.

22 Which system of equations will yield the same solution as the system below?

$$\begin{aligned}x - y &= 3 \\2x - 3y &= -1\end{aligned}$$

- | | |
|---------------------------------------|-------------------------------------|
| (1) $-2x - 2y = -6$
$2x - 3y = -1$ | (3) $2x - 2y = 6$
$2x - 3y = -1$ |
| (2) $-2x + 2y = 3$
$2x - 3y = -1$ | (4) $3x + 3y = 9$
$2x - 3y = -1$ |

23 Which of the three situations given below is best modeled by an exponential function?

- I. A bacteria culture doubles in size every day.
- II. A plant grows by 1 inch every 4 days.
- III. The population of a town declines by 5% every 3 years.

- | | |
|--------------|---------------|
| (1) I, only | (3) I and II |
| (2) II, only | (4) I and III |

24 The length, width, and height of a rectangular box are represented by $2x$, $3x + 1$, and $5x - 6$, respectively. When the volume is expressed as a polynomial in standard form, what is the coefficient of the 2nd term?

- | | |
|-----------|-----------|
| (1) -13 | (3) -26 |
| (2) 13 | (4) 26 |
-