

Name: \_\_\_\_\_ Academic Integrity Signature: \_\_\_\_\_

*I have abided by the UNCG Academic Integrity Policy.***Read all of the following information before starting the exam:**

- It is to your advantage to answer ALL of the 20 questions.
- It is your responsibility to make sure that you have all of the problems.
- There is no need to complete the test in order. The problems are independent.
- *Budget your time!*

Page:	1	2	3	4	5	6	Total
Points:	20	25	25	15	10	5	100
Score:							

1. (5 points) Solve  $10 - 3y \leq -2(y - 2)$  for  $y$ .
  - A.  $\{y \mid y \geq -6\}$
  - B.  $\{y \mid y \leq -6\}$
  - C.  $\{y \mid y \geq 6\}$**
  - D.  $\{y \mid y \leq 6\}$
  - E. None of the above.
  
2. (5 points) Find the slope of the graph of the equation  $2x - 3y = 4$ .
  - A.  $-\frac{2}{3}$
  - B.  $\frac{2}{3}$**
  - C.  $\frac{3}{2}$
  - D. 2
  - E. None of the above.
  
3. (5 points) Which of the following lines pass through the points  $(2, 1)$  and  $(3, -3)$ ?
  - A.  $y = -4(x - 2) + 1$**
  - B.  $y = -4(x + 1) + 1$
  - C.  $y = (x + 2) - 3$
  - D.  $y = -4(x - 1) + 5$**
  - E. None of the above.
  
4. (5 points) A cost analysis by XYZ computer corporation has determined that they incur fixed costs of \$3000 per day to run the factory and variable costs of \$100 per computer assembled. Assuming the cost function  $C(x)$  is linear, determine its equation, i.e., determine the cost of manufacturing  $x$  computers per day.
  - A.  $C(x) = 3000x + 100$
  - B.  $C(x) = 3000$
  - C.  $C(x) = 100x$
  - D.  $C(x) = 100x + 3000$**
  - E. None of the above.

5. (5 points) Find the domain of the function  $f(x) = \frac{x - 6}{x^2 - 2x + 1}$ .
- A.  $\{x \mid x \neq -1\}$   
 B.  $\{x \mid x \neq 6\}$   
 C.  $\{x \mid x \neq 0\}$   
**D.  $\{x \mid x \neq 1\}$**   
 E. None of the above.
6. (5 points) A computer chip manufacturer has determined the following price-demand function  $p = 216 - 4x$ , where  $p$  is the unit price when demand is  $x$  chips. Find the price they should charge for their processors in order to maximize revenue.
- A. \$27    **B. \$108**    C. \$54    D. \$120    E. None of the above.
7. (5 points) Find the exact value of  $y$  in the following expression  $y = \log_9\left(\frac{1}{3}\right)$ .
- A.  $-2$     B.  $3$     C.  $\frac{1}{3}$     D.  $\frac{1}{2}$     **E. None of the above.**
8. (5 points) Solve  $3^{x^2} = 9^{6-2x}$  for  $x$ .
- A.  $x = 6, -2$     B.  $x = 2$     **C.  $x = -6, 2$**     D.  $x = 0$     E. None of the above.
9. (5 points) *Income tax.* The table below shows a recent NC income tax schedule.
- | If taxable income is |              |  |
|----------------------|--------------|--|
| Over                 | But Not Over | Tax Due Is                                 |
| \$0                  | \$30,000     | 3.5% of taxable income                     |
| \$30,000             | \$60,000     | \$1,050 plus 6.25% of excess over \$30,000 |
| \$60,000             |              | \$2,925 plus 6.45% of excess over \$60,000 |
- Find the tax due for household with income \$56,500.
- A. \$1243.75    B. \$3,531.25    C. \$1,656.25    **D. \$2,706.25**    E. None of the above.

10. (5 points) Find the range of the function  $f(x) = x^2 - 4x + 3$ .
- A.  $\{y \mid y \geq -1\}$
  - B.  $\{y \mid y \geq 1\}$
  - C.  $\{y \mid y \geq 3\}$
  - D.  $\{y \mid y \leq -1\}$
  - E. None of the above.
11. (5 points) Solve  $x^2 + 2x - 3 = 5$  for  $x$ .
- A.  $x = -4, 2$
  - B.  $x = 4, -2$
  - C.  $x = 1, -3$
  - D.  $x = -1, 3$
  - E. no (real) solutions
12. (5 points) If \$1,000 is invested in an account paying 7% compounded monthly, how much will be in the account at the end of 10 years? Round to the nearest cent.
- A. \$1,967.15
  - B. \$2,013.75
  - C. \$2,132.17
  - D. **\$2009.66**
  - E. None of the above.
13. (5 points) You want to retire in 40 years and you think you need about \$1 million to do so. How much money do you need to put into your stocks today to have \$1 million in 40 years? You should assume continuously compounded interest at a interest rate of 11%. Round to the nearest dollar.
- A. **\$12,277**
  - B. \$15,384
  - C. \$121,295
  - D. \$234,276
  - E. None of the above.
14. (5 points) Solve the following equation for  $x$
- $$\log_2\left(\frac{4}{x}\right) + \log_2(x^3) = 3.$$
- A.  $x = 2$
  - B.  $x = 1$
  - C.  $x = \sqrt{2}$
  - D.  $x = \sqrt[3]{3}$
  - E. None of the above.

15. (5 points) Prehistoric cave paintings were discovered in a cave in France. The paint contained 32% of the original carbon-14. Use the carbon 14 exponential decay model  $A = A_0e^{-0.000121t}$  to estimate the age of the paintings.
- A. The paintings are approximately 10,125 years old.
  - B. The paintings are approximately 9,417 years old.**
  - C. The paintings are approximately 32 years old.
  - D. The paintings are approximately 8,435 years old.
  - E. The paintings are approximately 2,013 years old.

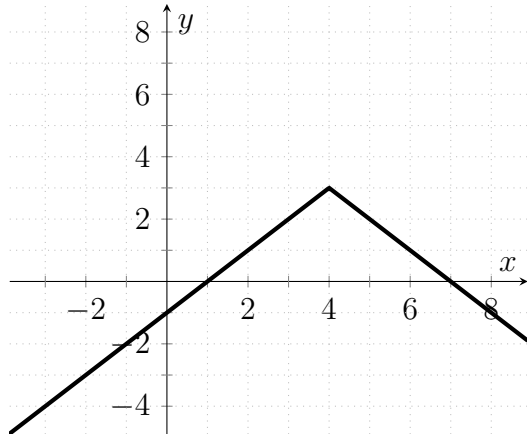
16. (5 points) Write the following expression as a single logarithm

$$3 \log(x) - \frac{1}{2} \log(y) + 6 \log(z).$$

- A.  $\log\left(\frac{18xz}{5y}\right)$
- B.  $\log(18xzy)$
- C.  $\log(10^{x^3} - \sqrt{y} + z^6)$
- D.  $\log\left(\frac{x^3z^6}{\sqrt{y}}\right)$**
- E.  $\log\left(\frac{x^3z^6}{2y}\right)$

17. (5 points) The fixed costs related to the publication of a book amount to \$60,270. The variable costs are equal to \$1.60 for each book produced. The book is sold to the distributors for \$18 each. How many books should be produced and sold to break even? Round to the nearest book.
- A. 3075   B. 5357   C. 2093   **D. 3675**   E. None of the above.

18. (5 points) Find the equation having the following graph:



- A.  $y = -|x - 4| + 3$
- B.  $y = |x - 4| + 3$
- C.  $y = -|x + 4| - 3$
- D.  $y = |x + 4| - 3$
- E. None of the above.

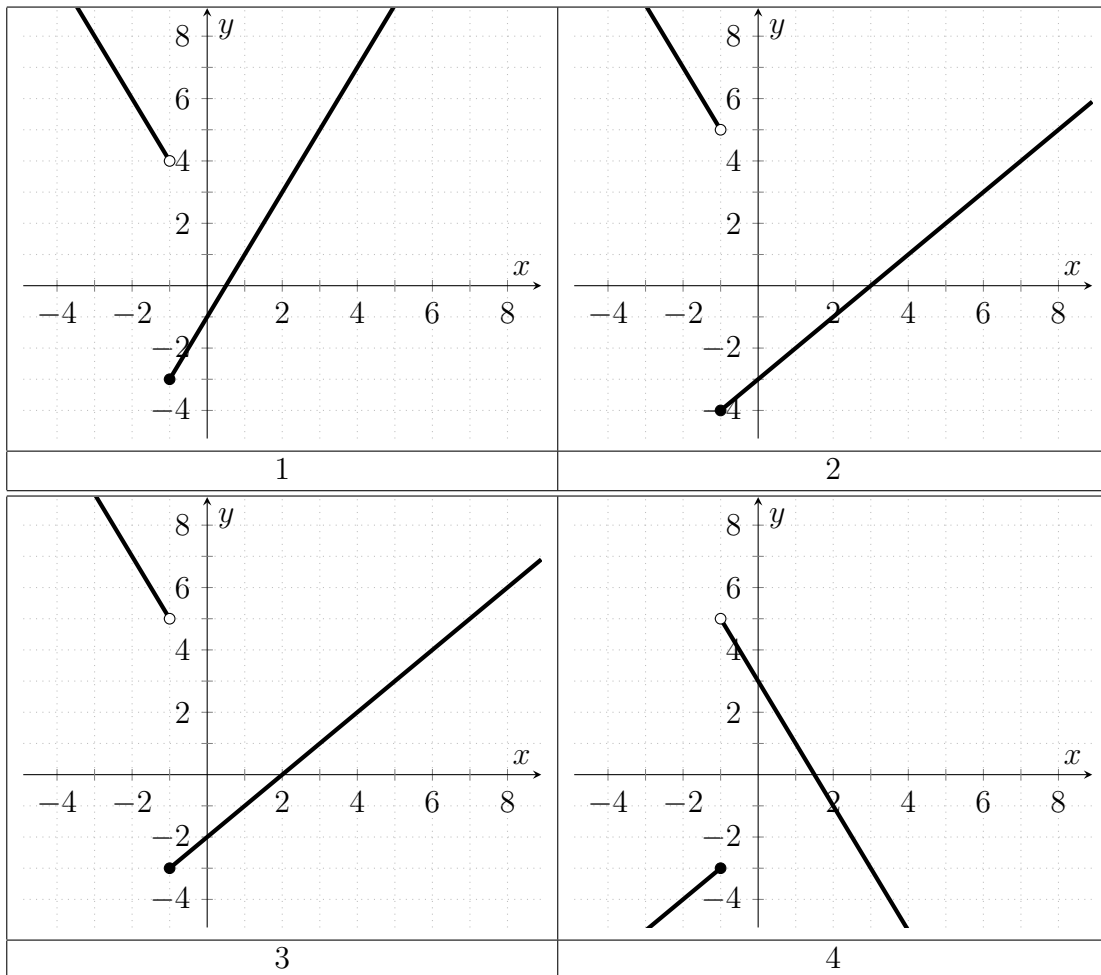
19. (5 points) Find the vertex and the minimum value of the quadratic polynomial

$$f(x) = 3(x - 1)^2 + 6.$$

- A. Vertex =  $(-1, 6)$ , minimum value = 6
- B. Vertex =  $(1, 6)$ , minimum value =  $-6$
- C. Vertex =  $(3, 6)$ , minimum value =  $-1$
- D. **Vertex =  $(1, 6)$ , minimum value = 6**
- E. None of the above.

20. (5 points) Choose the graph of the function  $y = f(x)$ , where

$$f(x) = \begin{cases} 3 - 2x & \text{if } x < -1, \\ x - 2 & \text{if } x \geq -1. \end{cases}$$



- A. 1    B. 2    C. 3    D. 4    E. None of the above.