PART 1: QUESTIONS

Name:_____ **Age:**_____ **Id:**_____ **Course:**_____

Algebra II - Exam 2 **Lesson: 4-6**

Instructions:

- Please begin by printing your Name, your Age, your Student Id , and your Course Name in the box above and in the box on the solution sheet.
- You have 90 minutes (class period) for this exam.
- You can not use any calculator, computer, cellphone, or other assistance device on this exam. However, you can set our flag to ask permission to consult your own one two-sided-sheet notes at any point during the exam (You can write concepts, formulas, properties, and procedures, but questions and their solutions from books or previous exams are not allowed in your notes).
- Each multiple-choice question is worth 5 points and each extra essay-question is worth from 0 to 5 points. (Even a simple related formula can worth some points).
- Set up your flag if you have a question.
- Relax and use strategies to improve your performance.

Exam Strategies to get the best performance:

- Spend 5 minutes reading your exam. Use this time to classify each Question in (E) Easy, (M) Medium, and (D) Difficult.
- Be confident by solving the easy questions first then the medium questions.
- Be sure to check each solution. In average, you only need 30 seconds to test it. (Use good sense).
- Don't waste too much time on a question even if you know how to solve it. Instead, skip the question and put a circle around the problem number to work on it later. In average, the easy and medium questions take up half of the exam time.
- Solving the all of the easy and medium question will already guarantee a minimum grade. Now, you are much more confident and motivated to solve the difficult or skipped questions.
- Be patient and try not to leave the exam early. Use the remaining time to double check your solutions.

1. A quadratic function is:

I. $xy = c, c \neq 0$

II. $y = a(x - x_1)(x - x_2)$,
where $a \neq 0$ and x_1, x_2 are the roots.

III. $y = ax^2 + bx + c, a \neq 0$

a) Only I is correct.
b) Only II is correct.
c) Only III is correct.
d) I, II, and III are correct.
e) None of the above.

2. If x_1 and x_2 are the roots of a quadratic function $y = ax^2 + bx + c, a \neq 0$ then:

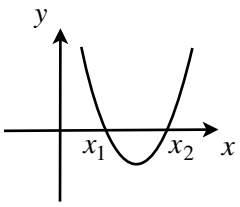
I. $x_1 . x_2 = \dfrac{c}{a}$

II. $x_1 + x_2 = \dfrac{b}{a}$

III. $x_1 = \dfrac{-b + \sqrt{\Delta}}{2a}$ and $x_2 = \dfrac{-b - \sqrt{\Delta}}{2a}$,
where $\Delta = b^2 + 4ac$.

a) Only I is correct.
b) Only III is correct.
c) Only III is correct.
d) I, II, and III are correct.
e) None of the above.

3. Given the graph of the quadratic function $y = ax^2 + bx + c, a \neq 0$ such that x_1 and x_2 are its roots:



Then:

a) $a > 0$ and $\Delta > 0$
b) $a > 0$ and $\Delta = 0$
c) $a > 0$ and $\Delta < 0$
d) $a < 0$ and $\Delta > 0$
e) $a < 0$ and $\Delta = 0$.

4. Let $y = ax^2 + bx + c, a \neq 0$ be a quadratic function with vertex $V(x_v , y_v)$.

I. $x_v = \dfrac{x_1 + x_2}{2}$ and $y_v = a(x_v^2) + b(x_v) + c$, where x_1 and x_2 are the roots.

II. $x_v = \dfrac{-b}{2a}$ and $y_v = \dfrac{\Delta}{4a}$

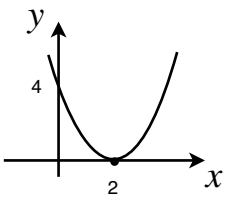
III. $x_v = \dfrac{-b}{2a}$ and $y_v = \dfrac{-\Delta}{4a}$

a) Only I is correct.
b) Only II is correct.
c) Only III is correct.
d) Only I and II are correct.
e) None of the above.

5. The value of m such that the quadratic function $y = x^2 - 4x + m$ has two distinct roots is:

a) $m < 4$
b) $m < 5$
c) $m < 8$
d) $m < 16$
e) None of the above.

6. The quadratic function of the following graph is:



a) $y = x^2 - 6x + 8$
b) $y = x^2 - 4$
c) $y = -x^2 + 2x + 3$
d) $y = x^2 - x - 12$
e) None of the above.

7. Find the minimum value of the following quadratic function:

$y = x^2 - 6x + 8$

a) -1 b) 0 c) 1 d) 2 e) None of the Above.

8. The perimeter of a rectangle is 24 ft. The maximum area of the rectangle is:

a) $4\ \text{ft}^2$
b) $16\ \text{ft}^2$
c) $36\ \text{ft}^2$
d) $625\ \text{ft}^2$
e) None of the above.

9. Find the formula for the revenue function if the price-demand function of a product is $p = 100 - 2x$, where x is the number of items sold and the price is in dollars. How many items should be sold in order to maximize the revenue? What is the maximum revenue?

a) 2 items and \$40
b) 4 items and \$32
c) 9 items and \$243
d) 20 items and \$800
e) None of the above.

10. Given:

I. If $p(c) = 0$ then c is the zero or root of $p(x)$.

II. A polynomial function is any function in the form:

$p(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots + a_1 x + a_0;\ a_n \neq 0.$

III. When the polynomial $p(x)$ is divided by $x - a$, the remainder is $p(a)$.

Then:

a) I, II, and III are incorrect.
b) I, II, and III are correct.
c) Only I and II are correct.
d) Only II and III are correct.
e) None of the above.

11. Given:

I. $p(x) = 2x^5 + 3x - 2$
II. $p(x) = x^{16} - x^{-1}$
III. $p(x) = -x + 1$

Then:

a) Only I and II are polynomials.
b) Only I and III are polynomials.
c) Only II and III are polynomials.
d) I, II, and III are polynomials.
e) None of the above.

12. Given $p(x) = -x^2 + x$ and $d(x) = x + 1$, then:

I. $p(x) - d(x) = -x^2 - 1$

II. $p(x) \cdot d(x) = -x^3 + x$

III. In the division $\frac{p(x)}{d(x)}$, the quotient is $q(x) = -x + 2$ and the remainder is $r(x) = 2$.

a) Only II and III are correct.
b) Only I and III are correct.
c) Only I and II are correct.
d) I, II, and III are correct.
e) None of the above.

13. The remainder of $p(x) = -x^3 - x^2 + 3$ by

$d(x) = -x - 1$ is:

a) -1 b) 2 c) 3 d) 4 e) None of the above.

14. Let x_1, x_2, and x_3 be the roots of

$p(x) = x^3 - 6x^2 + 11x - 6.$

Given $x_1 = 1$ then $k = (x_2)^2 + (x_3)^2$ is:

a) $k = 5$
b) $k = 10$
c) $k = 13$
d) $k = 25$
e) None of the above.

15. Let $q(x)$ and $r(x)$ be the quotient and remainder by the division of $p(x) = x^3 - 1$ by $d(x) = x^2 - 2$. Then $q(x) + r(x)$ is:

a) $2x - 1$
b) $x^2 - 1$
c) $-x^2 + 1$
d) $x^2 - x + 1$
e) None of the above.

16. Let $g : A \to B$ and $f : A \to B$ be functions. The composition of function $fog(x) = f[g(x)]$ exists if:

Notation: Im : Image and D : Domain.

a) $Im_g = Im_f$
b) $D_g = D_f$
c) $Im_f = D_g$
d) $Im_g = D_f$
e) None of the above.

17. Given $f : \mathbb{R} \to \mathbb{R}$ and $g : \mathbb{R} \to \mathbb{R}$ such that $f(x) = 6x + 4$ and $g(x) = 3x - 1$.

Then $f[g(1)]$ is:

a) 1 b) 3 c) 14 d) 16 e) None of the above.

18. Given $f : \mathbb{R} \to \mathbb{R}$ and $g : \mathbb{R} \to \mathbb{R}$ such that $f(x) = 5x - 1$ and $f[g(x)] = 2 - 3x$. Then:

a) $g(x) = \frac{x}{2} + 1$
b) $g(x) = 2x - 8$
c) $g(x) = \frac{3x}{4} + \frac{3}{4}$
d) $g(x) = -\frac{3x}{5} + \frac{3}{5}$
e) None of the above.

19. Given $f : \mathbb{R} \to \mathbb{R}$ and $g : \mathbb{R} \to \mathbb{R}$ such that $f(x) = x + 2$ and $g[f(x)] = x - 2$. Then:

a) $g(x) = 2x + 7$
b) $g(x) = -3x + 2$
c) $g(x) = -2x + 13$
d) $g(x) = x - 4$
e) None of the above.

20. If $g(x) = \sqrt[9]{x - 3}$ and $h(x) = x^9 + 1$. Then:

a) $h[g(x)] = x$
b) $h[g(x)] = x + 5$
c) $h[g(x)] = x - 1$
d) $h[g(x)] = x - 2$
e) None of the above.

PART 2: SOLUTIONS

Consulting

Name:_____ **Age:**_____ **Id:**_____ **Course:**_____

Multiple-Choice Answers

Questions	A	B	C	D	E
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Let this section in blank

	Points	Max
Multiple Choice		100
Extra Points		25
Consulting		10
Age Points		25
Total Performance		160
Grade		A

Extra Questions

21. Graph $y = x^2 - 4x$.

22. Calculate m such that the quadratic function $y = 4x^2 + 4x + m^2$ has two distinct real roots:

23. Given the equation $3x + y = 36$, find x and y such that the product $P = x\,y$ be a maximum.

24. Given $f(x) = \dfrac{8 - x}{\sqrt[3]{x - 8}}$. Find the domain of $f(x)$.

25. Show me that Derivatives are easy. Let $f(x)$ be a polynomial such that $f(x) = x^n$. Then the derivative of $f(x)$ called $f'(x)$ is $f'(x) = n\,x^{n-1}$. Find the derivative of $f(x) = x^7$.