Math 2201 **Chapter 7 Review** **Name:** _____

Part I: Multiple Choice – Circle the letter that corresponds with the best answer. **[10 marks]**

1. To solve the quadratic equation $3x^2 + 11x - 4 = 0$, Irene correctly factors the equation as $(3x-1)(x+4) = 0$. What are the solutions of the equation?

A. $\frac{-1}{3}, 4$ B. $\frac{1}{3}, -4$ C. $3, -4$ D. $-3, 4$

2. Yuko's steps for solving the quadratic equation $2x^2 - 5x - 4 = 0$ using the quadratic formula are shown below. She **incorrectly** determines that the solutions are 0.64 and -3.14, to the nearest hundredth. In which step did Yuko's **first** mistake occur?

A. 1
B. 2
C. 3
D. 4

STEP 1 $x = \frac{-5 \pm \sqrt{(-5)^2 - 4(2)(-4)}}{2(2)}$

STEP 2 $x = \frac{-5 \pm \sqrt{25 + 32}}{4}$

STEP 3 $x = \frac{-5 \pm \sqrt{57}}{4}$

STEP 4 $x = 0.64, \ -3.14$

3. What are the roots of the quadratic equation $x^2 - 1 = 0$?

A. -2 and -1
B. -2 and 0
C. -1 and 0
D. -1 and 1

4. Which expression is the factored form of $3x^2 + 11x - 4$?

A. (3x + 4)(x - 1)
B. (3x + 1)(x - 4)
C. (3x - 1)(x + 4)
D. (3x - 4)(x + 1)

5. Which **values of x** are solutions of the quadratic equation $x^2 - 8x = 20$?

A. $x = -2, x = 10$
B. $x = -10, x = 2$
C. $x = -8, x = -20$
D. $x = 8, x = 20$

$x^2 - 8x - 20 = 0$
$(x + 2)(x - 10) = 0$
$x + 2 = 0$, $x - 10 = 0$
$x = -2$, $x = 10$

20
1, 20
2, 10
4, 5

6. What is the **simplest form** of $\frac{-5 \pm \sqrt{75}}{5}$?

(A) $\pm 5\sqrt{3}$
(B) $-1 \pm 5\sqrt{3}$
(C) $-1 \pm \sqrt{3}$
(D) $-1 \pm \sqrt{75}$

$= \frac{-5 \pm \sqrt{25}\sqrt{3}}{5}$
$= \frac{-5 \pm 5\sqrt{3}}{5}$
$= -1 \pm \sqrt{3}$

7. Which quadratic function has zeros of $\frac{1}{2}$ and -3?

A. $f(x) = 2x^2 - 7x + 3$
B. $f(x) = 2x^2 - 5x - 3$
C. $f(x) = 2x^2 + 5x - 3$
D. $f(x) = 2x^2 + 7x + 3$

$x = \frac{1}{2}$, $x = -3$
$2x = 1$, $x + 3 = 0$
$2x - 1 = 0$
$(2x - 1)(x + 3) = 0$
$2x^2 + 6x - x - 3 = 0$
$2x^2 + 5x - 3 = 0$

8. What are the **solutions** of the quadratic equation $25x^2 - 36 = 0$?

A. $x = -\frac{6}{5}, x = \frac{6}{5}$
B. $x = -5, x = 5$
C. $x = \frac{5}{6}, x = -\frac{5}{6}$
D. $x = 6, x = -6$

$(5x - 6)(5x + 6) = 0$
$5x - 6 = 0$, $5x + 6 = 0$
$5x = 6$, $5x = -6$
$x = 6/5$, $x = -6/5$

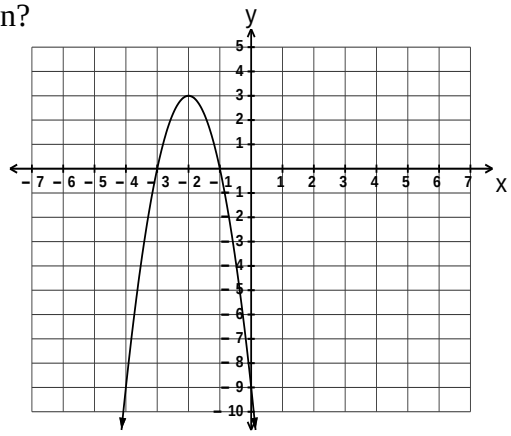
9. Which quadratic equation has **no real solutions**?

A. $x^2 - 9 = 0$
B. $x^2 + 4x + 3 = 0$
C. $x^2 - 3 = 0$
D. $x^2 + 4 = 0$

$b^2 - 4ac < 0$ no solution
$b^2 - 4ac = 0$ 1 solution
$b^2 - 4ac > 0$ 2 solutions

$0^2 - 4(1)(-9) = 36$
$4^2 - 4(1)(3) = 16 - 12 = 4$
$0^2 - 4(1)(-3) = 12$
$0^2 - 4(1)(4) = -16$

10. What are the **x-intercepts** of the quadratic function shown?



A. **−3** & **− 1**
B. **−2** & **3**
C. **1** & **3**
D. **−9** & **0**

Answers to multiple choice.

1.____ **2.____** **3.____** **4.____** **5.____**

6.____ **7.____** **8.____** **9.____** **10.____**

Part II: Show all workings in the space provided for each question below.

11. Solve the quadratic equation $2x^2 - 8x + 3 = 0$, using the quadratic formula. Write your answer in EXACT simplified radical form. **[5 marks]**

Quadratic Formula

Reduced Radical

$$x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(2)(3)}}{2(2)}$$

$$x = \frac{8 \pm \sqrt{40}}{4}$$

$$x = \frac{8 \pm \sqrt{4}\sqrt{10}}{4}$$

$$x = \frac{8 \pm 2\sqrt{10}}{4}$$

$$x = \frac{4 \pm \sqrt{10}}{2}$$

$$x = \frac{4 - \sqrt{10}}{2}, \quad x = \frac{4 + \sqrt{10}}{2}$$

12. Algebraically find two consecutive even, natural numbers such that their product is 48. **[5 marks]**

$2x, 2x+2$

$2x(2x+2) = 48$

$4x^2 + 4x - 48 = 0$

$$x = \frac{-4 \pm \sqrt{4^2 - 4(4)(-48)}}{2(4)}$$

$$x = \frac{-4 \pm \sqrt{784}}{8}$$

$$x = \frac{-4 \pm 28}{8}$$

$$x = \frac{-4 - 28}{8}, \quad x = \frac{-4 + 28}{8}$$

$x = \frac{-32}{8}, \quad x = \frac{24}{8}$

$x = -4, \quad x = 3$

$2x = 2(3) = 6$

$2x+2 = 2(3)+2 = 8$

$6 \cdot 8 = 48$ ✓

or

$x, x+2$

$x(x+2) = 48$

$x^2 + 2x - 48 = 0$

$(x-6)(x+8) = 0$

$x - 6 = 0 \quad | \quad x + 8 = 0$

$x = 6 \quad | \quad x = -8$

$x + 2 = 8$

13. A cannonball is shot into the air as shown below. The height of the ball, above the ground, in metres, t seconds after being shot, is approximated by $h(t) = -5t^2 + 15t + 12$. Algebraically determine the **times** when the ball is at a height of 22 m. **[5 marks]**

$22 = -5t^2 + 15t + 12$

$5t^2 - 15t - 12 + 22 = 0$

$5t^2 - 15t + 10 = 0$

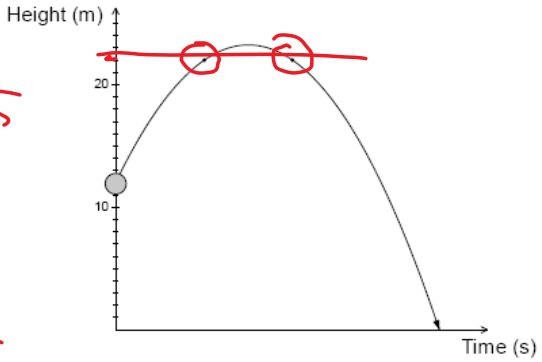
$x = \frac{-(-15) \pm \sqrt{(-15)^2 - 4(5)(10)}}{2(5)}$

$x = \frac{15 \pm \sqrt{25}}{10}$

$x = \frac{15 \pm 5}{10}$

$x = \frac{15-5}{10}$ $x = \frac{10}{10}$ $x = 1$

$x = \frac{15+5}{10}$ $x = \frac{20}{10}$ $x = 2$



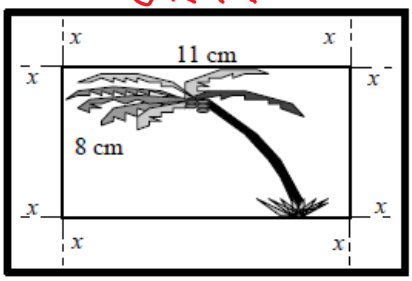
14. A photograph 8 cm by 11 cm will be framed as shown in the diagram. The combined area of the frame and the photograph will be **180 cm^2**. **[7 marks]**

A. Set up a **quadratic equation** to model the **total area**.

$l \cdot w = A$

$(2x+11)(2x+8) = 180$

$4x^2 + 16x + 22x + 88 - 180 = 0$



B. Using the quadratic equation in part A, algebraically determine the **width** of the frame, ***x***.

$4x^2 + 38x - 92 = 0$

$x = \frac{-38 \pm \sqrt{38^2 - 4(4)(-92)}}{2(4)}$

$x = \frac{-38 \pm \sqrt{2916}}{8}$

$x = \frac{-38 \pm 54}{8}$

$x = \frac{-38-54}{8}$, $x = \frac{-38+54}{8}$

$x = -11.5$ $x = 2$

Frame is 2cm wide.

C. What are the **outside dimensions** of the picture frame?

$2x + 8 = 2(2) + 8 = 12\text{cm}$

$2x + 11 = 2(2) + 11 = 15\text{cm}$