The exam is identical in format to this review. Only the layout and the actual numerical values of the questions will vary.

Multiple-Choice:
Record all answers to multiple-choice questions here. To clearly distinguish between A and D, it is recommended that you use capital letters. *(2 points each)*

#1-30: See multiple-choice packet.

Free-Response: (Total 40 points…exact points are listed in *italics* in each problem.)
You must show a reasonable amount of work that leads to your answer. Where it is impossible to show work, explain the mental leaps that you made to draw your conclusion.

31.   Write the quadratic formula. *(4 points)*

#32-37: Fully factor each expression.

32. $5x^3 - 20x^2$ *(2 points)*   35. $3x^3 + 9x^2 - 12x$ *(3 points)*

33. $x^2 + 11x + 24$ *(2 points)*   36. $x^2 - 64$ *(2 points)*

34. $3x^2 - 14x + 15$ *(2 points)*   37. $x^4 - 81$ *(3 points)*

#38-40: Solve each equation for x by any method of your choosing. (Give EXACT answers)

38. $2x^2 + 7x = 1$ *(4 points)*   40. $-3x^2 + 2x + 2 = 0$ *(4 points)*

39. $2x^3 - x^2 - 3x = 0$ *(4 points)*

41. Solve each quadratic inequality. Write your answer in parenthetical form. $3x^2 + 10x < -3$

(4 points)

42.   Write the quadratic function in vertex form and sketch the graph. Your graph must accurately show the vertex and two additional points. $y = 2x^2 + 16x + 25$ *(6 points)*

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the vertex of the graph of the function.

1) $f(x) = (x - 3)^2 + 5$　　　　　　　　　　　　　　　　　　　　　　　　1) _____
    A) (3, 5)　　　　　　B) (5, 3)　　　　　　C) (0, 3)　　　　　　D) (5, 0)

2) $f(x) = 4x^2 + 8x + 7$　　　　　　　　　　　　　　　　　　　　　　　　2) _____
    A) (-2, 2)　　　　　　B) (2, -2)　　　　　　C) (-1, 3)　　　　　　D) (3, -1)

Find the axis of the graph of the function.

3) $f(x) = 2x^2 + 12x + 16$　　　　　　　　　　　　　　　　　　　　　　　3) _____
    A) x = -2　　　　　　B) x = 3　　　　　　C) x = -3　　　　　　D) x = 4

Write the quadratic function in vertex form.

4) $y = x^2 - 14x$　　　　　　　　　　　　　　　　　　　　　　　　　　　4) _____
    A) $y = (x - 14)^2 - 196$　　　　　　　B) $y = (x + 14)^2 - 14$
    C) $y = (x + 7)^2 - 7$　　　　　　　　　D) $y = (x - 7)^2 - 49$

5) $y = x^2 + 4x + 5$　　　　　　　　　　　　　　　　　　　　　　　　　5) _____
    A) $y = (x - 2)^2 + 1$　　　　　　　　　B) $y = (x + 2)^2 + 1$
    C) $y = (x + 2)^2 - 1$　　　　　　　　　D) $y = (x - 2)^2 - 1$

Write an equation for the quadratic function whose graph contains the given vertex and point.

6) Vertex (4, 1), point (2, 5)　　　　　　　　　　　　　　　　　　　　　6) _____
    A) $P(x) = 2x^2 - 8x + 17$　　　　　　　B) $P(x) = -x^2 - 8x + 1$
    C) $P(x) = x^2 - 8x + 17$　　　　　　　　D) $P(x) = x^2 - 4x + 1$

Solve the problem.

7) A projectile is thrown upward so that its distance above the ground after t seconds is　　7) _____
    $h = -16t^2 + 640t$. After how many seconds does it reach its maximum height?
    A) 10 s　　　　　　B) 20 s　　　　　　C) 40 s　　　　　　D) 30 s

8) The number of mosquitoes M(x), in millions, in a certain area depends on the June rainfall x, in　　8) _____
    inches: $M(x) = 15x - x^2$. What rainfall produces the maximum number of mosquitoes?
    A) 0 in.　　　　　　B) 15 in.　　　　　　C) 225 in.　　　　　　D) 7.5 in.

Use regression to solve the problem. Round numbers to the nearest hundredth.

9) The first column shows the independent variable (x). The second column shows the dependent variable (y).

x	y
1	85
2	78
3	67
4	60
5	49
6	40
7	30
8	22
9	12

Find the quadratic regression equation.

A) $y = -0.03x^2 - 7.80x + 94.60$

B) $y = -0.04x^2 - 7.80x + 92.60$

C) $y = -0.03x^2 - 8.80x + 92.60$

D) $y = -0.04x^2 - 8.80x + 94.60$

Solve the equation by factoring.

10) $x^2 - x = 72$ 10) _____

A) $x = -8$ or $x = 9$

B) $x = -8$ or $x = -9$

C) $x = 8$ or $x = 9$

D) $x = 1$ or $x = 72$

11) $9x^2 + 27x + 5 = -15$ 11) _____

A) $x = -\dfrac{4}{3}$ or $x = -\dfrac{5}{3}$

B) $x = \dfrac{4}{3}$ or $x = \dfrac{5}{3}$

C) $x = -\dfrac{3}{4}$ or $x = -\dfrac{5}{3}$

D) $x = \dfrac{3}{4}$ or $x = \dfrac{3}{5}$

12) $26x^2 + 6x = 0$ 12) _____

A) $x = 0$

B) $x = \dfrac{3}{13}$ or $x = 0$

C) $x = -\dfrac{3}{13}$ or $x = \dfrac{3}{13}$

D) $x = -\dfrac{3}{13}$ or $x = 0$

Solve the equation by extracting the square roots.

13) $(r + 3)^2 = 14$ 13) _____

A) $r = -3 + \sqrt{14}$ or $r = -3 - \sqrt{14}$

B) $r = \sqrt{11}$ or $r = -\sqrt{11}$

C) $r = \sqrt{14}$ or $r = \sqrt{14}$

D) $r = 3 + \sqrt{14}$ or $r = 3 - \sqrt{14}$

14) $3y^2 - 12 = 3 - 3y^2$ 14) _____

    A) $y = -\sqrt{\dfrac{5}{2}}$ or $y = \sqrt{\dfrac{5}{2}}$ B) $y = -\sqrt{5}$ or $y = \sqrt{5}$

    C) $y = 3 - \sqrt{5}$ or $y = 3 + \sqrt{5}$ D) $y = 3 - \sqrt{\dfrac{5}{2}}$ or $y = 3 + \sqrt{\dfrac{5}{2}}$

Solve by completing the square.

    15) $x^2 + 2x - 15 = 0$ 15) _____

        A) $\sqrt{-15}, -\sqrt{-15}$ B) –3, 5   C) 3, –5   D) –10, –5

    16) $x^2 + 5x - 5 = 0$ 16) _____

        A) $\dfrac{-5 \pm 3\sqrt{5}}{2}$ B) $\dfrac{-5 - 3\sqrt{5}}{2}$ C) $-5 \pm 3\sqrt{5}$ D) $\dfrac{5 + 3\sqrt{5}}{2}$

Solve the equation using the quadratic formula.

    17) $2x^2 + 8x + 3 = 0$ 17) _____

        A) $x = \dfrac{-8 + \sqrt{10}}{2}$ or $x = \dfrac{-8 - \sqrt{10}}{2}$ B) $x = \dfrac{-4 + \sqrt{22}}{2}$ or $x = \dfrac{-4 - \sqrt{22}}{2}$

        C) $x = \dfrac{-4 + \sqrt{10}}{2}$ or $x = \dfrac{-4 - \sqrt{10}}{2}$ D) $x = \dfrac{-4 + \sqrt{10}}{4}$ or $x = \dfrac{-4 - \sqrt{10}}{4}$

Solve the equation graphically by finding x–intercepts.

    18) $x^2 - x - 3 = 0$ 18) _____

        A) $x = -1.30$ or $x = 2.30$ B) $x = -1.80$ or $x = 1.80$
        C) $x = -2.30$ or $x = 1.30$ D) $x = 0$ or $x = 1$

Solve the problem.

    19) The length of a rectangle is three inches more than the width. The area of the rectangle is 270   19) _____
        inches. Find the width of the rectangle.
        A) 8 inches   B) 18 inches   C) 9 inches   D) 15 inches

    20) The height of a box is 9 inches. The length is three inches more than the width. Find the width if   20) _____
        the volume is 1170 cu inches.
        A) 130 inches   B) 9 inches   C) 10 inches   D) 13 inches

    21) The profit made when t units are sold, $t > 0$, is given by $P = t^2 - 34t + 288$. Determine the   21) _____
        number of units to be sold in order for $P = 0$ (the break– even point).
        A) $t > 18$ B) $t = 34$
        C) $t = -18$ or $t = -16$ D) $t = 18$ or $t = 16$

    22) The cost of producing t units is $C = 5t^2 + 9t$, and the revenue generated from sales is $R = 6t^2 + t$.   22) _____
        Determine the number of units to be sold in order to generate a profit.
        A) $t > 10$ B) $t > 9$ C) $t > 0$ D) $t > 8$

23) If a rocket is propelled upward from ground level, its height in meters after t seconds is given by $h = -9.8t^2 + 98t$. During what interval of time will the rocket be higher than 205.8 m?

    23) _____

    A) $7 < t < 6$ B) $6 < t < 10$ C) $3 < t < 7$ D) $0 < t < 3$

Write the sum or difference in the standard form a + bi.

24) $(9 - 8i) + (5 + 6i)$

    24) _____

    A) $14 + 2i$ B) $4 + 14i$ C) $-14 + 2i$ D) $14 - 2i$

25) $(3 + 4i) - (-6 + i)$

    25) _____

    A) $9 + 3i$ B) $-3 + 5i$ C) $-9 - 3i$ D) $9 - 3i$

Write the product in standard form.

26) $5i(6 - 7i)$

    26) _____

    A) $35 + 30i$ B) $30i - 35i^2$ C) $30i + 35i^2$ D) $30i - 35$

27) $(3 + 8i)(5 - 9i)$

    27) _____

    A) $-57 + 67i$ B) $87 - 13i$

    C) $87 + 13i$ D) $-72i^2 + 13i + 15$

Write the expression in the form bi, where b is a real number.

28) $\sqrt{-152}$

    28) _____

    A) $2i\sqrt{38}$ B) $-2\sqrt{38}$ C) $2\sqrt{38}$ D) $-2i\sqrt{38}$

29) $\sqrt{-81}$

    29) _____

    A) $-i\sqrt{9}$ B) $-9i$ C) $9i$ D) ± 9

Write the expression in standard form.

30) $\dfrac{8 + 4i}{3 - 5i}$

    30) _____

    A) $-\dfrac{11}{4} + \dfrac{13}{8}i$ B) $-\dfrac{1}{8} + \dfrac{13}{8}i$ C) $\dfrac{44}{17} + \dfrac{28}{17}i$ D) $\dfrac{2}{17} + \dfrac{26}{17}i$

1) A
2) C
3) C
4) D
5) B
6) C
7) B
8) D
9) D
10) A
11) A
12) D
13) A
14) A
15) C
16) A
17) C
18) A
19) D
20) C
21) D
22) D
23) C
24) D
25) A
26) A
27) C
28) A
29) C
30) D