INSTRUCTIONS: **Simplify** and **box** all your answers. Write neatly and **show all work**. A correct answer with incorrect or no supporting work may receive no credit. Books, notes, and electronic devices are not permitted. The exam is worth 100 points. **Assume all questions have answers in the real numbers unless the instructions specify complex numbers.**

---

Potentially useful formulas:

(i) $a^3 - b^3 = (a-b)(a^2+ab+b^2)$

(ii) $a^3 + b^3 = (a+b)(a^2-ab+b^2)$

---

**NAME:** ________________________________________

1. The following are unrelated:

   (a) Simplify: $2 - 3i - (-1 + i^2)$.

   (b) Multiply: $\left(x^{1/2} + y^{1/2}\right)\left(x^{1/2} - y^{1/2}\right)$

   (c) Simplify. Leave answer in factored form: $\dfrac{2^{-3}(x+1)^{-3}}{4^{-1/2}(x+1)^5}$

   (d) Factor completely (If not factorable write NF): $y^2 - 4x^2$

   (e) Combine into a single fraction: $\dfrac{2}{x^2+x} - \dfrac{1}{x^2+4x+3}$

(f) Simplify the complex fraction: $\dfrac{\frac{1}{x-1} - \frac{1}{2(x-1)}}{3 + \frac{1}{x-1}}$

(g) Simplify: $\sqrt{50x^2y^4}$

(h) Rewrite with rational exponent(s): $\dfrac{\sqrt[3]{x^2} + \sqrt{x}}{x+2}$

2. For what value of $c$ is the number $x = 4$ a solution of the equation $\sqrt{x} + cx = 2c$?

3. Solve each of the following equations:

(a) $x^2 + 3 = 5x$

(b) $|3x - 1| = 4$

(c) $\dfrac{x+5}{x} = \dfrac{5+x}{x^2}$

(d) Solve for $C$: $\dfrac{CK - RK}{2} = -R$

(e) Solve for $q$: $rq = v + 1 - vq$

4. Answer each of the following for the points: $A(1,2)$ and $B(3,-3)$.

   (a) Graph the points on a graph with $xy$-axes. Clearly label points and numerical values on axes.

   (b) Find the the slope of the line passing through the two points.

   (c) Find the equation of the line in $y = mx + b$ (slope-intercept) form.

   (d) Find the point that is three-fourths of the way from point $B$ to point $A$. You may use the fact that $\left(2, -\dfrac{1}{2}\right)$ is the midpoint between $A$ and $B$.

5. Solve the following inequalities. Express all answers in interval notation.

   (a) $3 + 3x < x$

   (b) $x^3 - 3x^2 > 0$

   (c) $|x - 2| \leq 5$

   (d) $\dfrac{-3x}{x-5} \leq 0$

6. Find the $y$-coordinate(s) such that the distance from $(1, 1)$ to $(2, y)$ is 5.