HATT Practice Test R-1 Name: Block E Seat:

1. (3 points) If universal set $U = \{0, 1, 2, 3, 4, 5, 6, 7\}$, $A = \{1, 2, 3, 5\}, B = \{2, 3, 5, 7\}$, and $C = \{1, 4, 6\}$, find $(A \cup B) \cap \overline{C}$.

2. (2 points) Simplify the expression. Express the answer so that all exponents are positive. Whenever an exponent is 0 or negative, we assume that the base is not 0.

$$\frac{x^{-5}y^{10}}{x^4y^3}$$

3. (3 points) Write the domain of

$$f(x) = \frac{x^2 + 7x + 12}{x^3 - 9x}$$

in interval notation.

4. (4 points) A flagpole casts a shadow of 38 feet. Nearby, a 7-foot tree casts a shadow of 10 feet. What is the height (to the nearest inch) of the flagpole?

5. (4 points) Use synthetic division to find the quotient and the remainder:

$9x^3 + 63x^2 - 66x + 48$ divided by $x + 8$

6. (5 points) Expand $(2x - 5y)(x^2 + x + 1)$

7. (2 points) Factor $18x^2 + 6xy - 21xy - 7y^2$

8. (2 points) Factor $125 - 8x^3$

9. (4 points) Use synthetic division to find the quotient and the remainder:

$$x^4 + 256 \text{ divided by } x - 2$$

10. (2 points) Perform the indicated operations and simplify the result. Leave the answer in factored form.

$$\frac{x^3 + 1}{x^3 - x^2 + x} \cdot \frac{8x}{-72x - 72}$$

11. (2 points) Solve the equation:

$$6(x + 5) = 7\left[x - (3 - 2x)\right]$$

12. (2 points) Solve the equation:

$$\frac{2x}{x^2 - 9} = \frac{2}{x^2 - 9} - \frac{1}{x + 3}$$

13. (2 points) Solve for P:

$$P - \frac{7Q}{3} = \frac{P + 5}{2} + 1$$

14. (2 points) It costs \$57 per hour plus a flat fee of \$30 for a plumber to make a house call. What is the total cost to have a plumber come to a house for x hours?

15. (2 points) What number should be added to complete the square of the expression:

$$x^2 + \frac{1}{3h}x = 8$$

16. (2 points) Solve by completing the square:

$$\frac{1}{4}x^2 + \frac{1}{16}x - \frac{1}{8} = 0$$

17. (5 points) A circular pool measures 10 feet across. Two cubic yards of concrete is to be used to create a circular border of uniform width around the pool. If the border is to have a depth of 3 inches, how wide will the border be? (1 cubic yard = 27 cubic feet)

18. (2 points) Write the expression in the standard form $a + bi$.

$$\frac{5}{7+i}$$

19. (2 points) Write the expression in the standard form $a + bi$.

$$i^{17}$$

20. (5 points) Find the real solutions of the equation

$$3(x-1)^{2/3} + 5(x-1)^{1/3} + 2 = 0$$

21. (2 points) if $x < 8$, then
    (a) $-3x \geq -24$
    (b) $-3x \leq -24$
    (c) $-3x < -24$
    (d) $-3x > -24$
    (e) none of these

22. (2 points) For what values of x is it true that

$$|x+1| + 7 \leq 13$$

    (a) $[-7, 5]$
    (b) $[7, 13]$
    (c) $(-7, 5)$
    (d) $(7, 13)$
    (e) $(-\infty, -7) \cup (5, \infty)$
    (f) $(-\infty, -7] \cup [5, \infty)$
    (g) $(-\infty, -7) \cup (13, \infty)$
    (h) $(-\infty, -7] \cup [13, \infty)$
    (i) none of these

23. (5 points) A chemist needs 80 milliliters of a 62% solution but has only 42% and 80% solutions available. Find how many milliliters of each solution should be mixed to get the desired solution.

24. (5 points) Five friends drove at an average rate of 55 miles per hour to a weekend retreat. On the way home, they took the same route but averaged 70 miles per hour. What was the distance between home and the retreat if the round trip took 12 hours?

25. (5 points) Inga can sew a precut dress in 3 hours. Frank can sew the same dress in 4 hours. If they work together, how long will it take them to complete sewing that dress? Give your answer in minutes (1 hour=60 minutes).

Table 1: For grader's use only

page	points	possible
1		16
2		21
3		11
4		18
5		10
total		76