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Quiz 1 Solutions
MAC 1147.3881, Fall 2015
Thursday, September 3, 2015

Show all relevant work to support your answer. A correct answer without supporting work will not earn the points. **Problems 3 and 4 are on the back.**

You may use the formula: $u^3 - v^3 = (u - v)(u^2 + uv + v^2)$

1. (1 point) What is your favorite hobby? (Hint: There is no wrong answer)

1. _____

2. (4 points) Simplify the following expressions:

(a) $\dfrac{|x+8|}{x+8}, x < -8$

Solution: Observe that when $x < -8$, $|x+8| = -(x+8)$. Hence,

$$\frac{|x+8|}{x+8} = \frac{-(x+8)}{x+8} = -1.$$

(b) $\left(\dfrac{3a^2}{b^{-4}}\right)^{-2}$

Solution: We distribute the exponent inside the parenthesis to see

$$\left(\frac{3a^2}{b^{-4}}\right)^{-2} = \left(\frac{3^{-2}a^{-4}}{b^8}\right).$$

Now using properties of exponents, we can simplify the answer as

$$\left(\frac{3^{-2}a^{-4}}{b^8}\right) = \left(\frac{1}{3^2a^4b^8}\right) = \left(\frac{1}{9a^4b^8}\right).$$

3. (2 points) Factor the difference of two cubes completely: $x^3 - 8y^3$.

   A. $(x + y)(x^2 - xy + y^2)$

   B. $(x - 2y)(x^2 + 4xy + 4y^2)$

   C. $(x - y)(x^2 + xy + y^2)$

   D. $(x - 2y)(x^2 + 2xy + 4y^2)$

4. (3 points) Solve the following rational equation: $\dfrac{x-1}{2} + \dfrac{x-4}{4} = \dfrac{5}{8}$.

Solution: In order to get rid of all denominators at once, we multiple both sides by 8 (the least common multiple between 2, 4, and 8). Then we get

$$4(x - 1) + 2(x - 4) = 5.$$

Simplifying, we see $4x - 4 + 2x - 8 = 5$, so that $6x = 17$. Then the solution is $\dfrac{17}{6}$. Note that you should check your solution also.