Math 1010 - Exam 1

University of Utah

Fall 2009

Name: Solutions

1. Draw a real number line below, and plot and label the solutions to the following arithmetic problems. (10 points total)



2. Evaluate the following expressions. (15 points total)

(a)	$5\frac{2}{3} + 3\frac{1}{5}$	(3 points)
	$5\frac{2}{3} + 3\frac{1}{5} = \frac{17}{3} + \frac{16}{5}$	$=\frac{85}{15}+\frac{48}{15}=\frac{133}{15}.$
(b)	$(-3)^3$	(3 points)
	$(-3)^3 = -3 \times -3 \times$	$-3 = 9 \times -3 = -27.$
(c)	-2 + (- -4)	(3 points)
	-2 + (- -4) =	2 + (-4) = -2.
(d)	$\frac{3}{5} \div \frac{4}{3}$	(3 points)
	$\frac{3}{5} \div \frac{4}{3} = \frac{3}{5} \times \frac{3}{4} = \frac{9}{2}$	$\frac{9}{0}$.
(e)	21 - 5(7 - 5)	(3 points)
	$21 - 5(7 - 5) = 21 + 10^{-10}$	-5(2) = 21 - 10 = 11.

3. What property of real numbers is exemplified in the following expression: (5 points)

$$a(b+c) = ab + ac$$

The distributive law of real numbers.

4. Simplify the following algebraic expressions. (15 points total)

(a)
$$8x - 5x + 7x$$
 (3 points)
 $8x - 5x + 7x = 10x$.

(b)
$$3x^2 - 7 + 2x + 5x^2 + 11x - 3$$
 (4 points)
 $3x^2 - 7 + 2x + 5x^2 + 11x - 3 = (3x^2 + 5x^2) + (11x + 2x) + (-7 + -3)$
 $= 8x^2 + 13x - 10.$
(c) $8(x^3 - 4x^2 + 2)$ (2 points)

(c)
$$8(z^3 - 4z^2 + 2)$$
 (3 points)
 $8(z^3 - 4z^2 + 2) = 8z^3 - 32z^2 + 16.$
(d) $x(x^2 + 3) - 3(x + 4)$ (5 points)
 $x(x^2 + 3) - 3(x + 4) = x^3 + 3x - 3x - 12 = x^3 - 12.$

5. Evaluate the following expressions for the specified values of the variable(s). If not possible, state the reason. (10 points total)

(a)
$$3y^2 + 10$$

i. $y = -2$ (2 points)
 $3(-2)^2 + 10 = 22$
ii. $y = \frac{1}{2}$ (3 points)
 $3(\frac{1}{2})^2 + 10 = \frac{3}{4} + 10 = 10\frac{3}{4} \text{ or } \frac{43}{3}.$
(b) $\frac{x}{x-y}$
i. $x = 0, y = 10$ (2 points)
 $\frac{0}{0-10} = \frac{0}{-10} = 0.$
ii. $x = 3, y = 3$ (3 points)
 $\frac{3}{3-3} = \frac{3}{0}$ which is undefined, as we cannot divide by zero.
Therefore, evaluating the expression at $x = 3$ and $y = 3$ is not possible.

6. Find the value of x that satisfies the given linear equation. (10 points total)

(a)
$$8x - 10 = 0$$
 (4 points)
 $8x - 10 = 0$
 $\rightarrow 8x = 10$
 $\rightarrow x = \frac{10}{8} = \frac{5}{4}$.
(b) $6(x + 2) = 30$ (6 points)
 $6(x + 2) = 30$
 $\rightarrow 6x + 12 = 30$
 $\rightarrow 6x = 18$
 $\rightarrow x = 3$

7. Solve the following percentage problems. (10 points total)

(a)	What is 250% of 32?	(5 points)
	$2.5 \times 32 = 80.$	
(b)	What is 4% of 500 ?	(5 points)
	$.04 \times 500 = 20.$	

- 8. A restaraunt sells a bottle of wine for \$25 and paid \$15 for the bottle.
 - (a) What is the markup? (3 points) \$25 - \$15 = \$10.
 - (b) What is the markup rate? (5 points)

$$\frac{\$10}{\$15} = \frac{2}{3}$$
 or .666 or 66.6%.

9. Using the formula:

$$F = \frac{9}{5}C + 32$$

and given the fact that water freezes when $C = 0^{\circ}$ and boils when $C = 100^{\circ}$ calcualte: (7 points total)

(a) The temperature in Fahrenheit at which water freezes.(2 points)

$$F = \frac{9}{5}(0) + 32 = 32^{\circ}F$$

(b) The temperature in Fahrenheit at which water boils.(5 points)

$$F = \frac{9}{5}(100) + 32 = 180 + 32 = 212^{\circ}F.$$

10. Solve the following inequality and sketch the solution on the real number line. (10 points)

$$3x - 11 > -x + 7$$
.

3x - 11 > -x + 7 $\rightarrow 3x > -x + 18$ $\rightarrow 4x > 18$ $\rightarrow x > \frac{9}{2}.$

