First name: _____ Last name: _____ Student ID: _____

Calculations and Operations Homework

Basic problems

1. Simplify. Show work! Leave your answer in exact value.

1. $\sqrt{a^8}$	2. $\sqrt{w^{12}}$	3. $\sqrt{a^6b^{10}}$	4. $\sqrt{9a^2}$	5. $-\sqrt{81m^{64}}$
6. $\sqrt{49a^4b^{12}}$	7. $\sqrt{121x^{14}y^6}$	8. $\sqrt{18}$	9. $\sqrt{32}$	10. $\sqrt{72}$
11. $\sqrt{180}$	12. $\sqrt{50}$	13. $\sqrt{125}$	14. $-\sqrt{200}$	15. $\sqrt{720}$
16. $3\sqrt{12}$	17. $5\sqrt{48}$	18. $\sqrt{b^7}$	19. $\sqrt{9a^8}$	20. $\sqrt{32a^7b^4}$
21. $\sqrt{27a^{11}b^7}$	22. $\sqrt{75x^7y^5}$	23. $\sqrt{45a^7}$	24. $\sqrt{36x^2y^6}$	25. $\sqrt{12x^{20}y}$

2. Rationalize the expressions.

1. $\frac{1}{\sqrt{10}}$	2. $\frac{6}{\sqrt{2}}$	3. $\sqrt{\frac{a^4}{25}}$	4. $\frac{\sqrt{3}}{\sqrt{8}}$
5. $\frac{4}{\sqrt{8}}$	6. $\sqrt{\frac{9}{4}}$	7. $\frac{3}{\sqrt{5}}$	8. $\frac{4}{\sqrt{10}}$
9. $\frac{9}{\sqrt{48}}$	10. $\frac{5}{\sqrt{125}}$	11. $\frac{-4}{3\sqrt{2}}$	12. $\frac{3\sqrt{5}}{\sqrt{3}}$
13. $\frac{\sqrt{5}}{\sqrt{11}}$	14. $\frac{2\sqrt{2}}{\sqrt{10}}$	15. $\frac{\sqrt{5}}{\sqrt{32}}$	16. $\sqrt{\frac{2a}{5b}}$

Challenge problems

1. If x, y and 2x + y/2 are not zero, and then $(2x+\frac{y}{2})^{-1}[(2x)^{-1}+(\frac{y}{2})^{-1}]$ equals what?

2. If a and b are digits for which

$$\begin{array}{r} 2\ a \\ \times\ b\ 3 \\ \hline 6\ 9 \\ 9\ 2\ \\ \hline 9\ 8\ 9 \end{array}$$

, then a + b = ?

3. Letters *A, B,* C, and D represent four different digits selected from 0, 1, 2, . . . , 9.
If (*A* + *B*) / (*C* + D) is an integer that is as large as possible, what is the value of A+B?

4. A positive number x satisfies the inequality $\sqrt{x} < 2x$ if and only if
(A) x > 1/4 (B) x > 2 (C) x > 4 (D) x < ¼ (E) x < 4

5. Two positive numbers x and y are in the ratio a: b, where 0 < a < b. if x + y = c, then what is the smaller of x and y in terms of a, b, and c?

6. What is the largest integer n for which $n^{200} < 5^{300}$?

7. If a - 1 = b + 2 = c - 3 = d + 4, which of the four quantities a, b, c, d is the largest?

8. If b and c are constants and $(x + 2)(x + b) = x^2 + cx + 6$, then what is c?

9. If x > y > 0, then $\frac{x^y y^x}{y^y x^x} = ?$

10. Define the operation "o" by x o y = 4*x* - 3*y* + *xy*, for all real numbers x and y. For how many real numbers y does 3 o y = 12?

11. What is the value of $\sqrt{\frac{8^{10}+4^{10}}{8^4+4^{11}}}=?$

12. Define [a, b, c] to mean $\frac{a+b}{c}$, where c ≠ 0. What is the value of [[60, 30, 90], [2, 1, 3], [10, 5, 15]]?