Math 120

Final Practice Problems Summer 2004   Name:_____

> Show all relevant work!

1. Multiply out the following binomial products:

    (a) $(9n - 4m)(9n + 4m)$

    (b) $(x - 5y)(x - 3y)$

    (c) $(4x^2 - 5)(3x^2 - 7)$

    (d) $(2x + 5y)(2x + 5y)$

    (e) $(a + 5b)(a - 2b)$

2. Solve: $x = 4 + \sqrt{32 - 2x}$

3. The function $A(t) = 12.4t^2 - 62t + 1652$ models the average household spending on dining out (in dollars), where t is the number of years since 1990.

    (a) According to this model, what was the average household spending in 1990?

    (b) According to this model, what was the average household spending in 1998?

    (c) According to this model, in what year after 1990 was the average household spending equal to $4000? Round to the nearest whole year.

4. If each is working alone, a helper takes twice as long to do a welding job as an experienced welder would take. Working together, the two welders take 8 hours to complete the job. How long does the helper take working alone?

5. Solve algebraically: $\log_8 t = -\frac{2}{3}$

6. Let $f(x) = x - 3$ and $g(x) = 2 - x^2$. Find and simplify both $(f \circ g)(x)$ and $(g \circ f)(x)$, then decide (and tell me!) whether f and g are inverses of each other or not.

7. Simplify: $\frac{x+9}{4x-36} - \frac{x-9}{x^2-18x+81}$

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8. You can travel 40 miles on a motorcycle in the same time that it takes to travel 15 miles on a bicycle. If your motorcycle's rate is 20 miles per hour faster than your bicycle's, find the average rate for each.

9. Find the formula for the inverses of the following functions. Write the inverse formulas with function notation.

   (a) $f(x) = 2(x - 1)$
   (b) $g(x) = \frac{3}{1-x}$
   (c) $h(x) = \sqrt[5]{2 - x}$
   (d) $j(x) = \log_4 x$
   (e) $k(x) = e^x$

10. Simplify: $\dfrac{\sqrt{45a^{11}b^3}}{\sqrt{5ab}}$

11. Solve by completing the square: $2x^2 + 6x + 5 = 0$

12. Simplify: $\sqrt[7]{x^{16}y^{11}}$

13. Determine the product: $(x - 6)(8x^2 + 3x - 3)$

14. In still water, a boat averages 18 miles per hour. It takes the same amount of time to travel 33 miles downstream, with the current, as it does to travel 21 miles upstream, against the current. What is the rate of the water's current?

15. Solve: $\dfrac{4}{2x^2-7x-15} - \dfrac{2}{2x^2+13x+15} = \dfrac{-2}{x^2-25}$

16. Simplify: $(a^{-5}b^{-6})^5(a^{-2}b^5)^{-4}$

17. Write the given logarithmic equations in exponential form:

    (a) $4 = \log_2 16$

    (b) $2 = \log_3 x$

    (c) $5 = \log_b 32$

    (d) $\log_5 125 = y$

    (e) $y = \log_c x$

18. Factor each of the following completely:

    (a) $6t^2 + 7t - 3$

    (b) $2t^2 + 15t + 18$

    (c) $32a^3 - 4ab^9$

    (d) $6ax + 4bx - 3ay - 2by$

    (e) $x^2 + 37x - 3948$

19. Solve the inequality: $x^2 + 7x + 12 \geq 0$