Week in Review # 2

MATH 142 Drost-Spring 2010

2.5, 3.1, 3.2, Algebra Review

2.5 Logarithmic Functions

1. Rewrite in logarithmic form:
   a. $5^{-2} = .04$
   b. $e^o = 1$
   c. $10^3 = 1000$

2. Solve each of the following equations. Find
   (i) the exact answer, and
   (ii) an approximate solution rounded to four decimal places.
   a. $6 \cdot 9^x = 126$
   b. $5 \cdot 3^{x+1} = 200$
   c. $2e^x + 4 = 52$

3. Using the rules of logarithms, rewrite without any products, quotients, or powers:
$$\log \frac{100x^3}{y^2 z^5}$$

4. Solve for x: $\frac{3}{2}\ln 4 + \frac{2}{3}\ln 8 - 2\ln 2 = \frac{1}{2}\ln x$

5. Evaluate given: $\log_b(A) = x, \log_b(B) = y$, and $\log_b(C) = 3$,
$$\log_b\left\{\frac{A\sqrt{B}}{C^2}\right\}$$

6. Solve: $\log_9 = \frac{1}{2}$

7. Simplify: $\dfrac{\log_5 400}{\log_5 20}$

8. Solve: $e^{2x} = 5$. Round your answer to four decimal places.

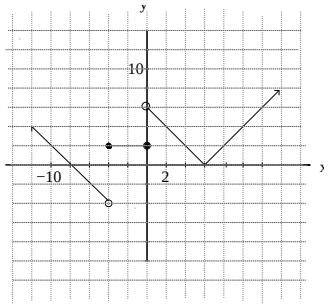
9. How long before an investment triples in value, when invested in a fund paying 6.5% compounded monthly?

3.1 Introduction to Limits

10. Evaluate: $\lim\limits_{x\to 3} \dfrac{2x^2 - 7x + 3}{x^2 + x - 12}$

11. Evaluate: $\lim\limits_{x\to 5} \dfrac{3x + 5}{x - 1}$

12. Evaluate: $\lim\limits_{x\to 2} f(x)$ where
$$f(x) = \begin{cases} 2(x+1)^2, & x < 2 \\ 10x - 2, & x > 2 \end{cases}$$



13. Determine each of the following from the graph of $f(x)$ above:
   a. $\lim\limits_{x\to -4^+} f(x)$
   b. $\lim\limits_{x\to -4^-} f(x)$
   c. $\lim\limits_{x\to -4} f(x)$

14. Find $\lim\limits_{x\to 8}(x^2 - 4x + 5)$.

15. Find $\lim\limits_{x\to -1} \sqrt{-2x^2 + 4x + 10}$

16. Evaluate: $\lim\limits_{x\to 4} \dfrac{x^2 + 4}{x + 1}$

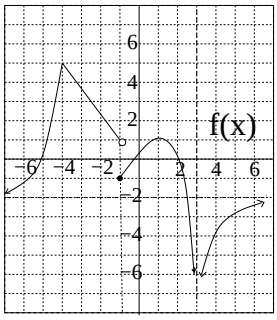
17. Evaluate: $\lim\limits_{x\to 3} \dfrac{x^2 - 9}{x - 3}$

18. Evaluate: $\lim\limits_{x\to 2^-} \dfrac{|\, x - 2\,|}{x - 2}$

3.2 Continuity

19. Find the intervals over which $f(x)$ is continuous where
$$f(x) = \begin{cases} \dfrac{x^2 + 3x - 4}{x^2 - 6x + 5}, & x < 2 \\ \dfrac{x^2 + 3x - 40}{x^2 - 5x}, & x \geq 2 \end{cases}$$

20. Determine the values of x for which the function graphed below is discontinuous:



21. Determine whether the function is continuous at the given value of x.
   a. $f(x) = \dfrac{|\, x\,|}{x}$ at $x = 0$.
   b. $g(x) = \dfrac{x^2 - 16}{x^2 - 7x + 12}$ at $x = 4, x = 3$.

22. Determine the intervals over which each function is continuous:
    a. $f(x) = \sqrt{2x - 10}$
    b. $g(x) = \sqrt[3]{x^2 - x + 12}$
    c. $h(x) = x^2 - 3x + 2$

23. Solve $\dfrac{x-4}{x+2} \leq 0$

24. Determine which of the following functions are $1-1$.
    a. $f(x) = x^2 - 4x + 4$
    b. $g(x) = \sqrt{2x - 10}$
    c. $h(x) = -\mid x - 5 \mid +2$
    d. $C(x) = x^3 - 2$
    e. $P(x) = \ln(2x - 5)$
    f. $R(x) = e^{0.02x-1}$

Algebra Review

25. Find $\dfrac{f(x+h) - f(x)}{h}$, known as the **difference quotient**, for each of the following functions.
    a. $f(x) = 2x^2 - 3x + 5$
    b. $f(x) = \dfrac{x}{x+2}$
    c. $f(x) = \sqrt{2x - 5}$

26. For each function in problem #24, find
    $$\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

27. Write a function, $S(x)$, to represent the salesman's monthly salary if he earns a base salary of $\$1000$/month plus 8% of sales over $\$20,000$, and $\$15\%$ of sales over $\$50,000$, where x represents the total sales each month in dollars.