19A Midterm 1 Review Problems

1) $2log_b x + 3log_b y - 4log_b z = log_b?$

2) $log_4 \sqrt{2} = \underline{\quad}$

3) If $log2 = A$, $log3 = B$, and $log7 = C$, evaluate each log in terms of A, B and C

   a) $log(42)$

   b) $log(24)$

   c) $log\left(\frac{2}{21}\right)$

   d) $log(0.03)$

4a) Grant sells 300 cookies per week at $2 each. When he increased the price to $2.50, he only sold 200 cookies per week. Find the demand function, assuming it is linear. Include a sketch of the model. How many cookies should Grant expect to sell at a price of $1?

b) If Grant's cookie business has a fixed cost is $60 and a variable cost of $0.50, how many cookies does he need to sell at $2 each to break even? Define your variable and write a cost, revenue and profit function as part of your response.

5) (1.1, #43)

43. Social Website Popularity: Facebook The following table shows the percentage of U.S. adults who used FACEBOOK (t is the number of years since the start of 2013): ✳

Year t (since start of 2013)	0	2	4	6	8
Facebook use $p(t)$ (%)	57	63	67	69	69

a. Sketch the graph of p . One of the following models fits the data almost exactly. Which model is it?

    A. $p(t) = 1.5t + 57$

    B. $p(t) = 0.25t^2 - 3.5t + 57$

    C. $p(t) = -1.5t + 57$

    D. $p(t) = -0.25t^2 + 3.5t + 57$

b. Use the model to estimate $p(5)$. Interpret your answer.

c. Does the shape of the curve you sketched suggest that Facebook membership was accelerating or decelerating over the period 2013–2021?

6) Find an exponential function of the form $f(x) = A \cdot B^x$ that passes through (1, 10) and (3, 40).

7a) $500 is invested, without withdrawals, into a savings account paying 4% interest compounded continuously. How long will it take for the investment to double in value?

*Hint: $A = Pe^{rt}$

b) If the $500 was invested in a saving account where the interest was compounded annually, what would the interest rate need to be for the money to double in 10 years?

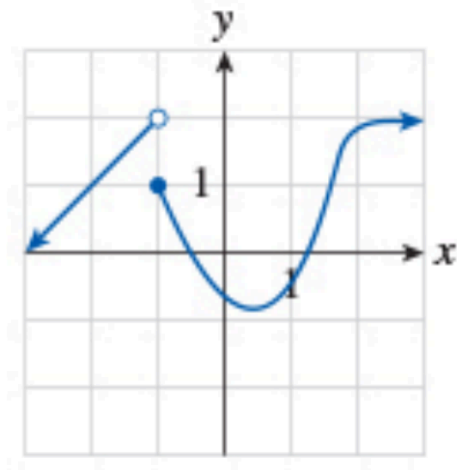*Hint: $A = P(1 + r)^t$

8) (2.4, #47)

47. Sound Intensity The decibel level of a TV set decreases with the

distance from the set according to the formula

$$D = 10 \log\left(\frac{320 \times 10^7}{r^2}\right),$$

where D is the decibel level (dB) and r is the distance from the TV

set in feet.

a) Find the decibel level at a distance of 10 ft.

b) How far from the TV must a listener be so that the decibel level drops to 0 dB?
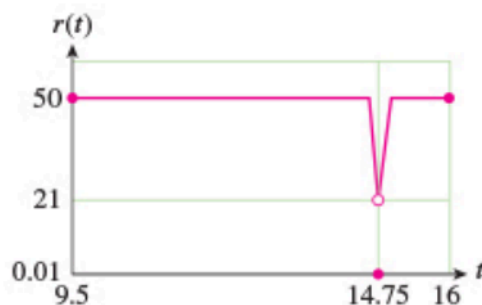
9)

a) $\lim\limits_{x \to -1^-} f(x)$

b) $\lim\limits_{x \to -1^+} f(x)$

c) $\lim\limits_{x \to -1} f(x)$

d) $\lim\limits_{x \to \infty} f(x)$

10) (10.1, #57)

57. **Flash Crash** The graph shows a rough representation of what

happened to the Russell 1000 Growth Index Fund (IWF) stock price

on the day of the U.S. stock market crash at 2:45 pm on May 6, 2010,

the "Flash Crash" (t is the time of the day in hours, and $r(t)$ is the

price of the stock in dollars). ✱

a. Compute the following (if a limit does not exist, say why):

$$\lim_{t \to 14.75^-} r(t), \qquad \lim_{t \to 14.75^+} r(t), \qquad \lim_{t \to 14.75} r(t), \qquad r(14.75).$$

b. What do the answers to part (a) tell you about the IWF stock

price?

11) (10.2, #13)

13. $\lim\limits_{x \to -1} \dfrac{3x^2 + 4x + 1}{x^2 - 1}$

12) (10.2, #22)

22. $\lim\limits_{x \to 0} \dfrac{-2}{x^2}$

13) (10.2, #23)

23. $\lim\limits_{x \to -1} \dfrac{x^2 + 3x + 2}{x^2 + 2x + 1}$

14) (10.2, #76)

76. $\displaystyle\lim_{x\to-\infty} \frac{x^6 + 3{,}000x^3 + 1{,}000{,}000}{2x^6 + 1{,}000x^3}$

15) (10.2, #78)

78. $\displaystyle\lim_{x\to-\infty} \frac{2x^4 + 20x^3}{1{,}000x^3 + 6}$

16) (10.2, #82)

82. $\displaystyle\lim_{x\to\infty} \frac{2}{5 - 5.3e^{-3x}}$

17) (10.3, #29) Determine the interval(s) for which $f(x)$ is continuous.

$$29.\ f(x) = \begin{cases} x + 2 & \text{if } x < 0 \\ 2x - 1 & \text{if } x \le 0 \end{cases}$$

18) Find the value of c that makes $f(x) = \frac{x^2+5x-14}{x-2}$ if $x \ne 2$, c if $x = 2$ continuous everywhere.

19) Find the domain of each function in interval notation.

a) $f(x) = \dfrac{\sqrt{3-x}}{x+1}$

b) $f(x) = \log\left(4 - x^2\right)$