Suggested Homework Problems

Honors Math 142

Section	Problems
1.1	3–51, 56–65
1.2	5–9, 11, 12, 16–28, 32, 33, 38–50, 55–59, 60–62(parts a, b and c only) 63–68, 75(parts a-d), 76–79
1.3	5–46
1.4	2, 4, 5, 7, 9, 11, 13–17, 24–27, 29–34, 36–39, 44–47, 50–57, 60–63, 67–71
1.5	1–21, 23–33 odd, 43, 44, 47, 51, 53–57, 63, 64, 68, 69, 70
1.6	1–20, 25–29, 31, 32, 35, 36, 37, 40, 41, 45, 46, 47, 53–55
1.7*	1–4,5–12(also give the domain), 21–27, 31–35, 43–60, 63
1.8*	1–15
2.1	5, 6, 9, 10, 19–46, 50–53, 57, 58, 59, 61, 62
2.2	3–6, 9–24, 29–54
2.3	8–12, 27, 28, 29, 31, 33–41, 45, 55, 56, 57, 65–70, 73, 74, 76, 77
2.4	17–67, 78, 79
2.5	1–47, 53, 55
2.6	5–8, 19–46
3.2	3–25
4.1	1–68
4.2	1–47
4.3	1–52
4.5	5–12, 13–21(odd), 23–28, 32–36, 39–46
5.1	1-44, 51, 52, 54, 57–61
*	See the additional problems for this section.

Additional Problems for Section 1.7

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1. Solve for x.
   (a) $5 * 10^{5x} = 3$
   (b) $6 = 2 * 10^{-3x}$
   (c) $5e^{3.1x} = 25$
   (d) $\log 10^x = 4$
   (e) $\ln(4 - x) = \frac{1}{2}$
   (f) $\ln(x^2 - 3) = 0$
   (g) $2\log(2x + 5) + 6 = 0$
   (h) $\ln(\ln 3x) = 0$
   (i) $\ln(x + 3) + \ln(x - 3) = \ln(7)$
   (j) $\log(x - 2) + \log(x + 4) = \log 7$
   (k) $\log_x(15 - 2x) = 2$
   (l) $\log_x(12x - 20) = 2$

2. Use the properties of logarithms to rewrite the following as the sum and/or difference of logarithms
   (a) $\ln(x + 5)^4 e^5$
   (b) $\log\left(\frac{100x^4}{y^3}\right)$
   (c) $\log_5\left(\frac{x+3}{y^4 z^2}\right)$

3. Write as a single logarithm.
   (a) $7\log(x + 5) + 2\log(x + 1)$
   (b) $\log_2 x + 5\log_2(y + 1) + 2\log_2(z - 1)$
   (c) $2\ln(x + 4) - 5\ln y + 3\ln z$

1. In 1969, all field goal attempts and successes were analyzed in the National Football League and American Football League. The percentages of success are shown in the table. (The data has been summarized: all tries between 10 and 19 yards from the goal are listed as 14.5 yards out. etc.)[1]

Distance	14.5	24.5	34.5	44.5	52
Fraction of tries that were successful	0.9	0.75	0.54	0.29	0.15

   (a) Discuss whether a linear or exponential model fits best.
   (b) For the exponential graph, what success rate does this function predict from a distance of 50 yards?
   (c) For the exponential graph, what is the distance that would have a success rate of 0.5?
   (d) Is there a better model for this data?

2. The size of the average farm in the United States has been growing steadily over the years. The accompanying data, obtained from the U.S. Department of Agriculture, gives the size of the average farm(in acres) from 1940 to 1997. [2]

Year	1940	1950	1960	1970	1980	1997
Avg. Size(acres)	168	213	297	374	427	471

   (a) What regression model would be good to use with this data? Explain.
   (b) Using your model, what was the size of the average farm in 1985?
   (c) In what year was the size of the average farm 435 acres?

3. The table lists the total (cumulative) number of AIDS cases (in thousands) diagnosed in the United States up to 1996. For example, a total of 22,620 AIDS cases were diagnosed between 1981 and 1985.[3] When you put the data in the calculator, let time start in 1980, i.e. x=0 is 1980.

Year	AIDS Cases	Year	AIDS Cases
1982	1.563	1990	193.245
1983	4.647	1991	248.023
1984	10.845	1992	315.329
1985	22.620	1993	361.509
1986	41.662	1994	441.406
1987	70.222	1995	515.586
1988	105.489	1996	584.394
1989	147.170		

   (a) What regression model would model the data best? Explain.
   (b) In what year would the total number of AIDS cases diagnosed go above 1 million?

4. The number of abandoned cars in New York City has dropped in recent years because of reduced auto theft and increasing scrap metal prices. The following table, based on estimates from a graph in *The New York Times*, gives the number of abandoned cars as a function of the year. [4] let time start in 1986, i.e. 1986 is x=0.

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Abandoned Cars(1000s)	82	120	140	148	135	95	75	51	38	27	20

   What regression model would model the data best? Explain.

[1] Applied Calculus, abridged. by Hughes-Hallett/Gleason/Lock/Flath/et al. pg 110
[2] Finite Mathematics, 7th ed. by Tan. pg. 60
[3] Finite Mathematics and Calculus, 6th ed. by Lial, Greenwell and Ritchey. pg. 513
[4] Finite Mathematics and Calculus, 6th ed. by Lial, Greenwell and Ritchey. pg. 528

Compute these limits $\lim_{x\to a^-} f(x)$, $\lim_{x\to a^+} f(x)$, and $\lim_{x\to a} f(x)$ at the indicated value, a, for each of these functions.

1. $a = 1,\ f(x) = \begin{cases} 3x-4 & \text{if } x \le 1 \\ 7-2x & \text{if } x > 1 \end{cases}$

2. $a = 0,\ f(x) = \begin{cases} x^4 - x + 1, & \text{if } x < 0 \\ x^2 - 4x + 1, & \text{if } x \ge 0 \end{cases}$

3. $a = 0,\ f(x) = \begin{cases} x^4 - x + 1, & \text{if } x < 0 \\ 4, & \text{if } x = 0 \\ x^2 - 4x + 1, & \text{if } x > 0 \end{cases}$

4. $a = -1,\ f(x) = \begin{cases} 3x + 6, & \text{if } x < -1 \\ x^2 - 1, & \text{if } -1 \le x < 2 \\ 3x^2 - 5x + 1, & \text{if } x \ge 2 \end{cases}$

5. $a = 2,\ f(x) = \begin{cases} 3x + 6, & \text{if } x < -1 \\ x^2 - 1, & \text{if } -1 \le x < 2 \\ 3x^2 - 5x + 1, & \text{if } x \ge 2 \end{cases}$

6. $a = 1,\ f(x) = \begin{cases} -x + 1, & \text{if } x < 1 \\ \dfrac{2}{1-x}, & \text{if } x > 1 \end{cases}$

7. $a = 2,\ f(x) = \begin{cases} \dfrac{-1}{x-2}, & \text{if } x > 2 \\ \dfrac{4}{2-x}, & \text{if } x < 2 \end{cases}$