

MATH 229
Answers for Review Sheet for Exam 3

1. Evaluate the following logarithms.

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|----------|----------|----------------|
| a. 1 | b. 5 | c. $1/4$ |
| d. -3 | e. -8 | f. $1/2$ |
| g. $3/2$ | h. $3/2$ | i. 4 |
| j. $1/3$ | k. 0 | ℓ . $1/2$ |
| m. -5 | n. 1 | o. 1.39 |
| p. 2.93 | q. 1.08 | r. 1.32 |

2. Write each logarithmic equation in exponential form.

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|------------------|------------------|---------------|
| a. $5^x = w$ | b. $p^{a-1} = 7$ | c. $10^n = m$ |
| d. $e^5 = t + 3$ | e. $k^2 = v$ | f. $4^n = 8$ |

3. Write each exponential equation in logarithmic form.

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|------------------------|----------------------|-------------------|
| a. $\log_6 y = x$ | b. $\log_m x = 3$ | c. $\ln y = 4$ |
| d. $\log_7(x - 4) = a$ | e. $\log n = 2w + 5$ | f. $\log_w x = y$ |

4. Use the properties of logarithms to expand each expression as much as possible.

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|---|---|
| a. $3 \ln a + 2 \ln b - \frac{1}{2} \ln c - 5 \ln d$ | b. $\frac{1}{2} \log_2 a - \frac{3}{2} \log_2 b - \frac{5}{2} \log_2 c$ |
| c. $2 \log x + \frac{1}{2} \log y - 3 - \log z$ | d. $3 \ln x + 5 - \ln 10 - \frac{1}{2} \ln a$ |
| e. $2 + \frac{1}{3} \log_3 x - \log_3 a - 3 \log_3 b$ | f. $3 - 2 \log_5 a - 3 \log_5 b - \frac{1}{4} \log_5 c$ |

5. Solve each equation. Approximate solutions to 4 decimal places when necessary.

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|------------------|----------------------|-----------------------|
| a. $x = -2$ | b. $x = \frac{1}{2}$ | c. $x = \frac{33}{6}$ |
| d. $x = -0.1383$ | e. $x = -1.3174$ | f. $x = 2.2235$ |

6. Fill in the missing parts of the table.

	Amount Invested	Method of Compounding	Annual Interest Rate	Accumulated Amount	Time (in years)
a.	\$4000	continuously	2.75%	\$4717.57	6
b.	\$6500	monthly	7%	\$21292.28	17
c.	\$1885.96	continuously	6.5%	\$5000	15
d.	\$6535.63	daily	4.25%	\$8800	7
e.	\$700	continuously	1.5%	\$1000	23.778 years
f.	\$1350	quarterly	12%	\$2000	3.324 years
g.	\$2400	continuously	$\approx 7.55\%$	\$3500	5
h.	\$1575	weekly	$\approx 12.64\%$	\$2300	3
i.	A_0	continuously	7.25%	double A_0	9.56 years
j.	A_0	continuously	5.75%	triple A_0	19.11 years
k.	A_0	continuously	$\approx 17.33\%$	double A_0	4
l.	A_0	continuously	$\approx 7.85\%$	triple A_0	14

7. Find the derivatives of the following functions.

$$\begin{array}{lll}
 \text{a. } f'(x) = x^2e^x + 2xe^x & \text{b. } g'(x) = \frac{xe^x - 2e^x}{x^3} & \text{c. } h'(u) = -2ue^{-u^2} \\
 \text{d. } f'(t) = -2t^2e^{-2t} + 2te^{-2t} & \text{e. } f'(x) = \frac{e^x - e^{-x}}{2} & \text{f. } g'(x) = -96e^{8x}(2 - e^{8x})^{11} \\
 \text{g. } g'(x) = \frac{1-2\ln x}{x^3} & \text{h. } h'(x) = \frac{3x^2-1}{x^3-x} & \text{i. } f'(x) = \frac{2}{x-3} + \frac{7}{x+1}
 \end{array}$$

8. Use logarithmic differentiation to find the derivative of the following functions.

$$\begin{array}{l}
 \text{a. } f'(x) = 8x(x^2 - 2)^3(2x - 1)^3 + 6(x^2 - 2)^4(2x - 1)^2 \\
 \text{b. } g'(x) = 2x(x - 1)^3(x^2 + 4) + 3x^2(x - 1)^2(x^2 + 4) + 2x^3(x - 1)^3 \\
 \text{c. } h'(x) = 2(x + 3)\sqrt{3x - 2} + \frac{3(x+3)^2}{2\sqrt{3x-2}} \\
 \text{d. } f'(x) = (\ln 2)2^x
 \end{array}$$

9. $f(x)$ is increasing on $(-\infty, 0)$ and decreasing on $(0, \infty)$.

10. $f(x)$ is concave up on $(-\infty, -1)$ and $(1, \infty)$ and concave down on $(-1, 0)$ and $(0, 1)$.

11. There is a relative maximum at $(0, 0)$

12. $y = \frac{1}{\sqrt{e}}x$.

13. $y = 2x - 2 + \ln 3$.

14. Evaluate the following indefinite integrals.

$$\begin{array}{lll}
 \text{a. } \frac{1}{4}x^4 + C & \text{b. } 3x^{1/3} + C & \text{c. } 3e^x - \ln|x| + x^3 + C \\
 \text{d. } -\frac{1}{x^3} + C & \text{e. } 8x + C & \text{f. } \frac{1}{2}x^2 + \ln|x| + C
 \end{array}$$

15. Find $f(x)$ by solving the initial value problem.
- a. $f(x) = x^3 + \frac{1}{2}x^2 + 1$ b. $f(x) = e^x - x^4 + 4$ c.
 $f(x) = x^2 + \ln|x| - 4$
16. Page 901 problem 3. Answer is in the back of the book.
17. Find the area of the region under the graph of the function f on the interval $[a, b]$.
- a. 21 square units b. $e^2 - e - \frac{3}{2}$ square units
c. 8 square units d. 4 square units
18. Evaluate the following definite integrals.
- a. 6 b. $\frac{28}{3}$ c. $\frac{15}{2} + \ln 4$
d. $\frac{15}{2}$ e. $\frac{38}{3}$ f. $\frac{3}{2} + \ln 2$
19. Find the average value of the following functions over the given interval.
- a. 5 b. $\frac{e^3}{3} - \frac{1}{2}$ c. $-\frac{7}{15}$
20. Find the area of the region bounded below by the graph of each function and above by the x -axis from $x = a$ to $x = b$.
- a. $\frac{32}{3}$ b. $\frac{16}{3}$
21. Sketch the graphs of the functions f and g and find the area of the region enclosed by these graphs between the vertical lines $x = a$ to $x = b$.
- a. $\frac{4}{3}$ b. $\frac{10}{3}$

c. $\frac{31}{4}$

d. $\frac{64}{3}$

22. Sketch the graph and find the area of the region completely enclosed by the graphs of f and g .
- a. $\frac{1}{12}$ square units b. $\frac{1}{2}$ square units c. $\frac{9}{2}$ square units

23. page 949-950 #3, 5, 7 Answers in the book.

24. page 950 #11, 12, 16, 17 Answers in the book.