The Logarithm Bistro

Assessment Menu · choose your meal and show what you know

Name: _____

Date: _____

How to order

1. Order **4 Appetizers** (5 points each), **4 Entrées** (10 points each) and **2 Chef's Specials** (20 points each). The most you can earn is **100 points**.
2. Your 10 dishes must include **at least one of each skill**: EXPFUNC, LOGDEF, LOGPROP and SOLVE (the label next to each dish).
3. Mark your choices on the order form below **and** on the dishes themselves ("My pick"). Only marked dishes are graded, and you cannot swap a dish after turning it in.
4. Show your work in the space for each dish. Points are given for correct steps as well as correct answers.
5. Appetizers and Entrées are on pages 2 and 3. The Chef's Specials are on page 4. Look at every page before you choose!

Appetizers

5 pts each · choose 4

- ☐ **A1** (EXPFUNC)
- ☐ **A2** (LOGDEF)
- ☐ **A3** (LOGDEF)
- ☐ **A4** (LOGPROP)
- ☐ **A5** (SOLVE)
- ☐ **A6** (EXPFUNC)

Entrées

10 pts each · choose 4

- ☐ **E1** (EXPFUNC)
- ☐ **E2** (LOGDEF)
- ☐ **E3** (LOGPROP)
- ☐ **E4** (LOGPROP)
- ☐ **E5** (SOLVE)
- ☐ **E6** (SOLVE)

Chef's Specials

20 pts each · choose 2

- ☐ **S1** (EXPFUNC)
- ☐ **S2** (LOGDEF)
- ☐ **S3** (LOGPROP)
- ☐ **S4** (SOLVE)

My skill check (circle each skill you have covered): EXPFUNC · LOGDEF · LOGPROP · SOLVE

Course	Dishes	Points each	Possible	Score (teacher)
Appetizers	4	5	20	
Entrées	4	10	40	
Chef's Specials	2	20	40	
Total			**100**	

Appetizers

5 points each · choose 4 · Warm-ups

Name: _____

A1 EXPFUNC ☐ My pick · 5 pts

For $y = 200(0.85)^x$: **(a)** Is this growth or decay? **(b)** What is the decay factor? **(c)** By what percent does y change each time x increases by 1?

A2 LOGDEF ☐ My pick · 5 pts

Rewrite in the other form: **(a)** $5^3 = 125$ as a logarithm **(b)** $\log_7 49 = 2$ as an exponential equation

A3 LOGDEF ☐ My pick · 5 pts

Evaluate without a calculator: **(a)** $\log_2 32$ **(b)** $\log_3 \frac{1}{27}$ **(c)** $\log_6 1$

A4 LOGPROP ☐ My pick · 5 pts

Write as a single logarithm and simplify if possible: **(a)** $\log_2 6 + \log_2 5$ **(b)** $\log_5 40 - \log_5 8$

A5 SOLVE ☐ My pick · 5 pts

Solve for x: **(a)** $5^x = 125$ **(b)** $2^{x+1} = 64$

A6 EXPFUNC ☐ My pick · 5 pts

For $y = 2^x - 3$: **(a)** Give the equation of the horizontal asymptote. **(b)** Find the y-intercept. **(c)** Is the function increasing or decreasing?

Entrées

10 points each · choose 4 · Multi-step problems

Name: _____

E1 EXPFUNC ☐ My pick · 10 pts

$2,500 is invested at 6% annual interest. **(a)** Write A(t) if interest is compounded quarterly. **(b)** Find the balance after 5 years. **(c)** Find the balance after 5 years with continuous compounding, $A = Pe^{rt}$, and the difference. Round money to the nearest cent.

E2 LOGDEF ☐ My pick · 10 pts

(a) Evaluate $\log_4 8$ without a calculator. **(b)** Solve $\log_x 81 = 4$, with $x > 0$. **(c)** Solve $\log_5 x = -2$. **(d)** Explain why $\log_3(-9)$ is undefined.

E3 LOGPROP ☐ My pick · 10 pts

(a) Expand completely: $\log_3 \dfrac{9x^4}{y^2}$ **(b)** Write as one logarithm and simplify: $3 \ln 2 + \ln 5 - \ln 10$

E4 LOGPROP ☐ My pick · 10 pts

Maya wrote $\log(x + 5) = \log x + \log 5$. **(a)** Explain her error and give a numeric counterexample. **(b)** Use change of base to find $\log_3 20$ to the nearest thousandth. **(c)** Between which two integers is $\log_3 20$? Justify.

E5 SOLVE ☐ My pick · 10 pts

Solve using logarithms. Give the exact answer and then round to the nearest hundredth. **(a)** $7^x = 50$ **(b)** $4e^{2x} = 100$

E6 SOLVE ☐ My pick · 10 pts

Solve and check for extraneous solutions: **(a)** $\log_2 x + \log_2(x - 2) = 3$ **(b)** $\log_3(2x - 1) = 2$

Chef’s Specials

20 points each · choose 2 · Multi-part challenges Name: _____

S1 EXPFUNC ☐ My pick · 20 pts

Let $g(x) = 2^{x+1} - 4$. **(a)** Describe the transformations of the graph of $y = 2^x$. **(b)** Give the horizontal asymptote and the y-intercept. **(c)** Find the x-intercept exactly. **(d)** State the range of g.

S2 LOGDEF ☐ My pick · 20 pts

The pH of a solution is $pH = -\log[H^+]$. **(a)** Lemon juice has pH 2. Find $[H^+]$. **(b)** Rainwater has $[H^+] = 2.5 \times 10^{-6}$. Find its pH to the nearest tenth. **(c)** Solution A has pH 3 and solution B has pH 6. How many times greater is $[H^+]$ in A than in B?

S3 LOGPROP ☐ My pick · 20 pts

Suppose $\log_b 2 = 0.35$ and $\log_b 3 = 0.55$. Use properties of logs to find **(a)** $\log_b 6$ **(b)** $\log_b 18$ **(c)** $\log_b \frac{2}{9}$. **(d)** Write $2\log_b x + 3\log_b y - \log_b z$ as one logarithm. **(e)** Maya says $\log_b 5 = \log_b 2 + \log_b 3 = 0.90$. Explain her error.

S4 SOLVE ☐ My pick · 20 pts

A drug has 200 mg in the body and a half-life of 6 hours: $A(t) = 200\left(\frac{1}{2}\right)^{\frac{t}{6}}$. **(a)** How much remains after 18 hours? **(b)** When will 10 mg remain? **(c)** A population $P = 1200e^{0.04t}$ grows continuously. How long to double? Round (b) and (c) to the nearest tenth.