

Name _____

ZID _____

Directions:

1. **ALL WORK** should be organized to be readable and must be of sufficient depth to justify your answer by any method requested.
2. Correct answers with incorrect work or insufficient justification may receive no credit.
3. Give exact answers and **NOT** numeric approximations unless explicitly requested otherwise.
4. No Scratch paper outside of the Exam is permitted.
5. Only a basic **non-text capable, non-graphing** calculator is permitted.
6. **Graphing calculators, cell phones (turned off) and pdas shall be stowed out of sight. IF VISIBLE YOU WILL BE DEEMED TO BE CHEATING AND WILL RECEIVE A ZERO SCORE FOR THE EXAM!!!**

Problems: Check that your exam contains exactly 20 problems. Each problem is worth 5 points.

1. Simplify

$$\frac{x - \frac{1}{x}}{x + \frac{1}{x}}$$

2. Factor the expression $x^{1/2}(x^2 + x) - 3x^{3/2} - 3x^{1/2}$ (where $x \geq 0$).

3. What is the domain of the function f defined by $f(x) = \frac{x+2}{\sqrt{5+3x}}$?

4. Find the domain of $\log(4x^3 - x^5)$.

5. Simplify $\frac{2^{\sqrt{5}+1}}{2^{\sqrt{5}-1}}$

6. If $f(t) = \frac{1}{t} + 1$, then $f^{-1}(t) =$

7. Which is the largest?

(a) $\log(100)$

(d) $\log_2(15)$

(b) $\ln(e^3)$

(e) $\ln(e^{-8})$

(c) $\log_2(32)$

8. If $f(x) = \frac{x}{x^2 + 3}$ then $f(3 + h) =$

9. What is the average rate of change of $s(t) = 7t^2$ on $[2, 5]$?

10. Find the solution(s) of the equation $e^{3x+5} = 2$.

11. Simplify $[\log_5(9)][\log_3(5)]$

12. Solve $5^{-4x} = 2^{7+3x}$

For the next two problems:

$$f(x) = \frac{x + 6}{3x - 6} \quad \text{and} \quad g(x) = \frac{x + 1}{x - 2}.$$

13. The composition $g \circ f(x)$ is

14. The quotient $\left(\frac{g}{f}\right)(x)$ is

15. Circle each of the following that are **always** true for a *general* exponential function $F(x) = b^x$, $b > 0, b \neq 1$?

- (a) The domain is all real numbers
- (b) The range is all real numbers
- (c) The function is increasing
- (d) The function is decreasing
- (e) The y-axis is an asymptote
- (f) The x-axis is an asymptote
- (g) The graph crosses the y-axis at $y = 1$
- (h) The graph crosses the x-axis at $x = 1$

For the next two problems: let $f(x) = -\ln(x - 4)$.

16. (a) What is the domain of f ?
(b) What is the range of f ?

17. Sketch the graph of $y = f(x)$ showing any asymptotes and any x, y intercepts.

18. Write $\log_5 3 - 2\log_5 4 + \log_{25} 32$ in the form $\log_5 k$.

19. Solve $3(2^{2x}) - 5(2^x) + 2 = 0$

20. Circle each of the following that are **always** true for a logarithm function $G(x) = \log_b(x)$, $b > 1$?

- (a) The domain is all real numbers
- (b) The range is all real numbers
- (c) The function is increasing
- (d) The function is decreasing
- (e) The y-axis is an asymptote
- (f) The x-axis is an asymptote
- (g) The graph crosses the y-axis at $y = 1$
- (h) The graph crosses the x-axis at $x = 1$