

Name KEY

Instructor _____
Class Time _____

Show all work neatly for partial credit.

1. Solve for x and y.

(8)

$$3x + 2y = 10$$

$$2x + 5y = 3$$

$$6x + 4y = 20$$

$$6x + 15y = 9$$

$$-11y = 11$$

$$y = -1$$

$$2x = 3 - 5(-1) = 8$$

$$x = 4$$

1. $x = 4, y = -1$

2. Solve for x and y.

(8)

$$2x - y^2 = 0$$

$$x - y = 4$$

$$x = y + 4$$

$$2y + 8 - y^2 = 0$$

$$y^2 - 2y - 8 = 0$$

$$y = \frac{2 \pm \sqrt{4 + 32}}{2} = 1 \pm 3$$

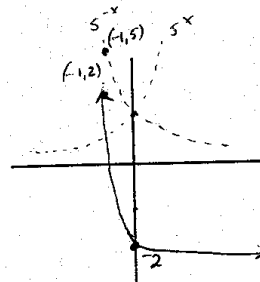
$$y = 4, (-2)$$

$$x = 8, 2$$

2. $(8, 4), (2, -2)$

3. Graph $f(x) = 5^{-x} - 3$. State domain and range.

(6)



3. domain: all real x's

range: $y > -3$ $(-3, \infty)$

4. Solve for x in the equations and give exact answers. Be sure to check your answers.
(4 ea)

(a) $-14 + 3e^x = 11$
 $3e^x = 25$
 $e^x = 25/3$
 $x = \ln 25/3$

(a) $x = \ln 25/3$

(b) $\log_2 x + \log_2(x+2) = \log_2(x+6)$ $x = \cancel{3}, 2$

$\log_2 \left(\frac{x^2 + 2x}{x+6} \right) = 0$

$\frac{x^2 + 2x}{x+6} = 1 = \frac{x+6}{x+6}$

$\frac{x^2 + x - 6}{x+6} = 0$

$x^2 + x - 6 = 0$
 $(x+3)(x-2) = 0$

(b) $x = 2$

(c) $\log_4 x - \log_4(x-1) = \frac{1}{2}$

$\log_4 \left(\frac{x}{x-1} \right) = \frac{1}{2}$

$\frac{x}{x-1} = \pm 2 = \pm \left(\frac{2x-2}{x-1} \right)$

Case 1: $x = 2x - 2$
 $x = 2$

Case 2: $x = -2x + 2$
 $3x = 2$
 $x = 2/3$

*extraneous,
doesn't work
in original*

(c) $x = 2$

(d) $e^{2x} - 4e^x + 3 = 0$

$(e^x - 3)(e^x - 1) = 0$

$e^x = 3$ $e^x = 1$

$x = \ln 3$ $x = \ln 1 = 0$

(d) $x = \ln 3, x = 0$

Rewrite as the logarithm of a single quantity.

5. $\ln 5 + \frac{1}{2} \ln(3-x^2) - 2 \ln y$

(4) $\ln \left(\frac{5(3-x^2)^{1/2}}{y^2} \right)$

5. $\ln \left(\frac{5(\sqrt{3-x^2})}{y^2} \right)$

6. Expand-write as a sum, difference or multiple of logarithms.

(4) $\log \sqrt[4]{\frac{a^2 b}{c^3}}$
 $\frac{1}{4} (\log a^2 b - \log c^3)$
 $= \frac{1}{2} \log a + \frac{1}{4} \log b - \frac{3}{4} \log c$

6. $\frac{1}{2} \log a + \frac{1}{4} \log b - \frac{3}{4} \log c$

For problems 7-8. Given: $\log_a 2 \approx .308$
 $\log_a 3 \approx .488$ $\log_a 5 \approx .715$

7. Find $\log_a \left(\frac{15}{2} \right)^2$.
(4) $= 2 \log_a 15 - 2 \log_a 2$
 $= 2 (\log_a 3 + \log_a 5) - 2 \log_a 2$
 $= 2 (.488 + .715) - 2 (.308)$
 $= 1.79$

17. 1.79

8. Find $\log_a \left(\frac{5a}{3} \right)$.
(4) $= \log_a 5 + \log_a a - \log_a 3$
 $= .715 + 1 - .488$
 $=$

18. 1.227

For problems 9-16, match the function with the proper graph.
(16)

E 9. $y = \log_3 x$

F 13. $y = -\log_3 x$

G 10. $y = \log_3 x - 1$

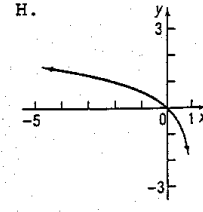
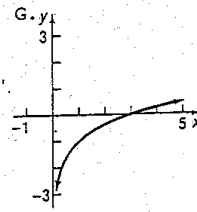
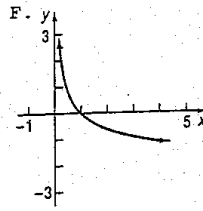
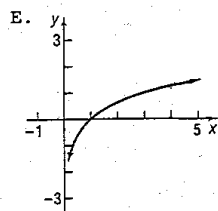
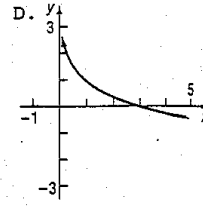
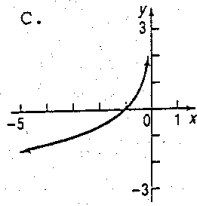
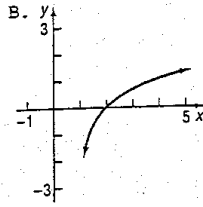
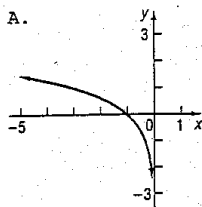
H 14. $y = \log_3(1-x)$

A 11. $y = \log_3(-x)$

C 15. $y = -\log_3(-x)$

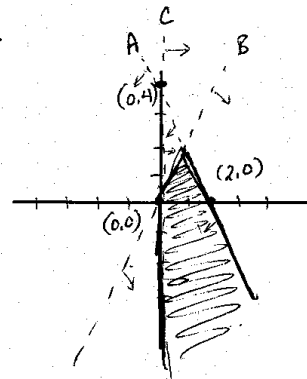
B 12. $y = \log_3(x-1)$

D 16. $y = 1 - \log_3 x$



17. Graph the system. Label all intercepts and label boundary lines of A, B, C.
(9)

- A. $2x + y \leq 4$ $(0, 4), (2, 0)$
 B. $2x - y \geq 0$ $(0, 0), (1, 2)$
 C. $x \geq 0$ $(0, 0), (0, 5)$



18. Find the equation of the parabola $y = ax^2 + bx + c$ passing through the points (0,-4), (-1,1) and (2,-2).
(8)

$$\begin{aligned}
 -4 &= c \\
 1 &= a - b + c \rightarrow 1 = a - b - 4 \rightarrow a - b = 5 \\
 -2 &= 4a + 2b + c \rightarrow -2 = 4a + 2b - 4 \rightarrow 4a + 2b = 2 \\
 & \qquad \qquad \qquad 2a + b = 1 \\
 & \qquad \qquad \qquad \underline{a - b = 5} \\
 & \qquad \qquad \qquad 3a = 6 \\
 & \qquad \qquad \qquad a = 2 \\
 & \qquad \qquad \qquad b = -3
 \end{aligned}$$

7. $y = 2x^2 - 3x - 4$

19. Evaluate $\frac{12(\ln 31)}{\ln 5 - \ln 3}$ to nearest 3 decimal places.
(4)

19. 80.669

20. Use your calculator to solve the following equation. Give your answer to 3 decimal places.
(4) $7^x = 18$

$$\begin{aligned}
 x \ln 7 &= \ln 18 \\
 x &= \frac{\ln 18}{\ln 7}
 \end{aligned}$$

20. 1.485

21. Find the value at the end of 4 years for \$2,600 invested at $5\frac{1}{4}\%$ with continuous compounding
(use $A = Pe^{rt}$).
(5)

$$\begin{aligned}
 A &= 2600 e^{.0525(4)} \\
 &= \$3207.56
 \end{aligned}$$

21. \$3207.56