

MATH 120  
SPRING 2024  
EXAM 4

NAME:

1. 10 pts. each Find the domain of each in interval notation.

(a)  $f(x) = \ln(19 - 2x) + 64$

(b)  $f(x) = \log_2\left(\frac{x + 5}{x^2 + 10}\right)$

2. 10 pts. Condense the logarithmic expression, writing a single logarithm with coefficient 1 and simplifying where possible:

$$\log x + \log(x^2 - 1) - \log 7 - \log(x + 1)$$

3. 10 pts. each Solve each equation exactly. No rounded decimal answers!

(a)  $e^{x+1} = \frac{1}{e}$

(b)  $e^{4x} - 3e^{2x} - 18 = 0$

(c)  $1 - \ln \sqrt{x + 4} = 0$

(d)  $\log_9(x - 5) + \log_9(x + 3) = 1$

4. 10 pts. The half-life of strontium-90 is 25 years. How long will it take a 50 mg sample to decay to a mass of 32 mg? Round to the nearest tenth of a year.

5. 10 pts. A wooden artifact from an ancient tomb contains 71% of the carbon-14 that is present in living trees. How long ago was the artifact made, given that the half-life of carbon-14 is 5730 years?

6. 10 pts. Solve the system by the substitution or addition method:

$$\begin{cases} 2x - 7y = 2 \\ 3x + y = -20 \end{cases}$$

7. 10 pts. Solve the system:

$$\begin{cases} x + y = -4 \\ y - z = 1 \\ 2x + y + 3z = -21 \end{cases}$$

8. 10 pts. A box contains \$8.40 in pennies, nickels, and dimes. How many of each type of coin is in the box if the number of dimes is six less than twice the number of pennies, and there is an equal number of nickels and dimes?