

Math 131 Exam 1 Review

1. A line contains the point (2, 6). On this line, each increase of 3 in x produces a decrease of 9 in y . Find the y -intercept of this line.
2. Write the function that is the result of $y = e^x$ after applying the following transformations in the given order: reflection across the y -axis, shift left 2 units, stretch vertically by a factor of 4.
3. The half life of a drug in the body is 4 days. What portion of the original amount taken is present after 12 days?
4. A substance weighed 20g at time $t=0$ days. It grew exponentially so that at $t=6$ days it weighed 30g. At how many days will it weigh 50g? Round the number of days to 2 decimal places if needed.

5. Use your calculator to evaluate $\lim_{x \rightarrow 0} \frac{\sin 5x}{3x}$.

6. Find $\lim_{x \rightarrow -3^+} -2 \ln(x + 3)$

7. $f(x) = \begin{cases} 4x^2 + Ax & x < 3 \\ 2x + A & 3 \leq x \end{cases}$

Find the value of A that makes $f(x)$ continuous for all x .

8. $f(x) = 5(2^x) - 6$ Find $f^{-1}(34)$?

9. $f(x) = \ln(a \cdot b^x)$ can be simplified to what type of function? Write its equation.

10. For $f(x) = \ln(x^2 + 1)$ and $g(x) = e^x$, $h(x) = g(f(x))$ simplifies to what function?

11. For the data points $\begin{array}{c|c} x & 1 & 2 & 3 & 4 & 5 \\ \hline y & 2 & 5 & 3 & 5 & 8 \end{array}$,

Find the cubic regression model. Write the leading coefficient (rounded to 3 decimal places if necessary).

What does the cubic model predict for the y -value when $x=6$?

Viewing the graph, which two data points are closest to the cubic regression model?

12. A substance initially weighed 25 g but decays exponentially. After six years it weighs 20 g.

a) What will it weigh after 12 years?

b) Write the equation for the weight in grams after t years.

c) Find the half life of the substance, rounded to three decimal places if necessary.

13. Evaluate each limit as a number, as ∞ , $-\infty$ or state DNE.

For a and b, $f(x) = \frac{x^2 - x - 6}{x^2 - 5x + 6}$

a) $\lim_{x \rightarrow 3^+} f(x)$ b) $\lim_{x \rightarrow 2^-} f(x)$ c) $\lim_{x \rightarrow 0} \tan\left(\frac{1}{x}\right)$ Use the calculator. Keep zooming in.

d) $\lim_{x \rightarrow 0} \frac{\tan(x)}{x}$ Use the calculator.

14.

$$f(x) = \begin{cases} \ln(2-x) & 2 < x \\ \frac{x^2 - 7x + 10}{x^2 - 4x - 5} & 2 \leq x < 7, \quad x \neq 5 \\ 3x & 7 \leq x \quad \text{or} \quad x = 5 \end{cases}$$

Evaluate each of the following:

$\lim_{x \rightarrow 2^-} f(x)$ $\lim_{x \rightarrow 2^+} f(x)$ $f(2)$

Is f continuous at $x = 2$? What is seen in the graph at $x = 2$?

$\lim_{x \rightarrow 5^-} f(x)$ $\lim_{x \rightarrow 5^+} f(x)$ $f(5)$

Is f continuous at $x = 5$? What is seen in the graph at $x = 5$?

$\lim_{x \rightarrow 7^-} f(x)$ $\lim_{x \rightarrow 7^+} f(x)$ $f(7)$

Is f continuous at $x = 7$? What is seen in the graph at $x = 7$?

15. Find the least squares regression line for the points $(1, 7)$, $(2, 11)$, and $(3, 12)$.
The y -value on this line when $x=1.5$ is

16. $y = A(e^{-3x})$ If x increases by 2 then what is the change in $\ln y$?

17. A culture grows so that its weight is doubled every 4 days. In how many days will the weight triple?

18. Find the inverse function to $f(x) = 3(e^{x+1})$.

19. Given that $f(8) = -3$ and $f(x)$ is an even function, what other point must be on the graph of $f(x)$?

20. a) Given that $\sin(\frac{\pi}{6}) = 0.5$ and $\sin x$ is an odd function, what other point must be on the graph of $\sin x$?

b) Use part a and $f(x) = \sin x$ on $[-\frac{\pi}{2}, \frac{\pi}{2}]$ is one to one. What two points must be on the inverse function?

21. Find the inverse function to $f(x) = \frac{3x+2}{x+5}$. Find the domain of each function.
Find the range of each function.

22. For $f(x) = 3x^2 + 4x - 9$;

a) Evaluate $\frac{f(x+h) - f(x)}{h}$ and simplify it.

b) Find $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$

23. Find all solutions to $2 \log_3(x-2) - \log_3(x-4) = 2$

24. Find the domain of the function $f(x) = \ln(x^2 - 9)$.