

Name _____ Period _____ Date _____

This practice test in its entirety is NON-CALCULATOR.

Vocabulary: **Directions** – Define each word *and* give an example.

1. Continuous Function
2. Intermediate Value Theorem
3. Normal Line

Short Answer

4. Describe how to find the left-hand limit of a function at a point.
5. What is the relationship between a function and its end-behavior model? Use limits in your answer.
6. Describe how to find the horizontal asymptote(s) of a function.
7. What is a jump discontinuity? Give an example of a function with a jump discontinuity.

Review

8. Find $f(a+h)$ for $f(x) = -x^4 + 3x - 1$
9. Factor the polynomial: $20x^2 - 23x + 6$

Unit One Problems

Directions: Show all work completed to obtain your final answers. Partial credit may be given for incorrect answers. No credit may be given for problems without work if it is required to obtain the answer. Circle or box in your final answers.

10. Find a value a so that the function

$$f(x) = \begin{cases} 3 - x^2, & x < -1 \\ ax^2 - 1, & x \geq -1 \end{cases}$$

is continuous.

11. The equation for free fall on Earth is $s = -4.9t^2$ ft, where t is in seconds. Assume a rock is dropped from a 60-ft cliff. Find the speed of the rock at $t = 2$ sec.

12. Determine $\lim_{x \rightarrow \pi} (3 \cos x - \sin x + 2)$ by substitution.

13. Find $\lim_{x \rightarrow -\infty} \frac{|8x + 6|}{4x - 2}$.

14. Assume that $\lim_{x \rightarrow a} f(x) = -1$ and $\lim_{x \rightarrow a} g(x) = 3$. Find the value of $\lim_{x \rightarrow a} (f(x) \cdot g(x))$.

15. Find the vertical asymptote(s) of the graph of $f(x) = \frac{x+2}{4-x^2}$. Describe the behavior of $f(x)$ to the left and right of each vertical asymptote.

16. For the function $f(x) = -2x^2 + 1$ at the point where $x = 3$, find

a) the slope of the curve.

b) an equation of the tangent line.

c) an equation of the normal line.

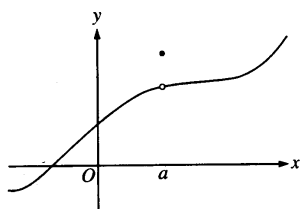
17. For the function $f(x) = \frac{x^3 - 2x^2 + 3x - 1}{4x^3 + 5x}$, find

a) a power function end behavior model.

b) any horizontal asymptotes.

Multiple Choice Questions: **Circle the best answer.**

18. The graph of a function f is shown below.



Which of the following statements about f is false?

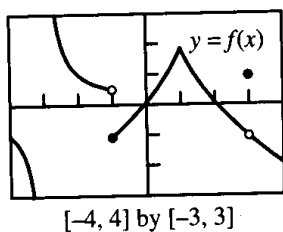
- (A) f is continuous at $x = a$.
- (B) $x = a$ is in the domain of f .
- (C) $\lim_{x \rightarrow a^+} f(x)$ is equal to $\lim_{x \rightarrow a^-} f(x)$.
- (D) $\lim_{x \rightarrow a} f(x)$ exists.
- (E) none of these
19. Let f be the function given by $f(x) = \frac{(x-1)(x^2-4)}{x^2-a}$. For what positive values of a is f continuous for all real numbers x ?

- (A) none (B) 1 only (C) 2 only (D) 4 only (E) 1 and 4 only

20. $\lim_{x \rightarrow 1} \frac{x}{\ln x}$ is

- (A) 0 (B) $\frac{1}{e}$ (C) 1 (D) e (E) nonexistent

21. The function f whose graph is shown below is continuous at which of the following points?



- (A) $x = -3$ (B) $x = -1$ (C) $x = 1$ (D) $x = 3$ (E) All of these.