Continuity Review Name _____

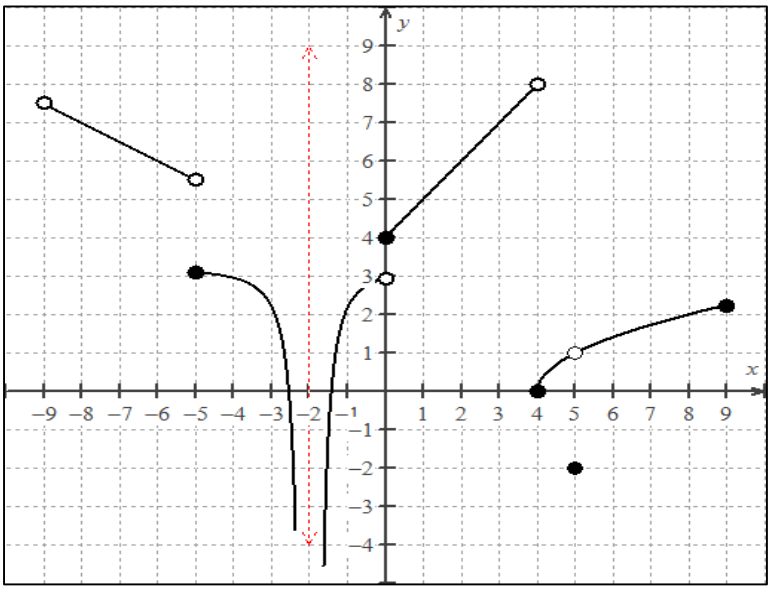
For problems 1 – 8, use the graph of $y = f(x)$.

1. What is the domain of f?

2. What is the range of f?

3. Find $f(-5)$ and $f(5)$.

4. Find $f(0)$ and $f(4)$.



5. Is f continuous at $x = -5$? Explain.

6. Is f continuous at $x = 5$? Explain.

7. What type of discontinuity occurs at $x = -2$?

8. State the value of x where a point discontinuity occurs.

In problems 9 – 14, determine whether f is continuous at c.

9. $f(x) = x^3 - 2x^2 + 3x - 4, c = 2$

10. $f(x) = \frac{x^2 + 5}{x - 4}, c = 3$

11. $f(x) = \frac{x^3 + 2x}{x^2 - 2x}, c = 0$

12. $f(x) = \frac{x^3 - 8}{x^2 + 4}, c = 2$

13. $f(x) = \frac{x - 5}{x + 5}, c = -5$

14. $f(x) = \begin{cases} \frac{x^2 + 3x}{x^2 - 3x} & if\ x \neq 0 \\ 2 & if\ x = 0 \end{cases}$

In problems 15 - 20, find the numbers at which *f* is continuous. At which numbers if *f* discontinuous?

15. $f(x) = -3\sin x$

16. $f(x) = 2\tan x$

17. $f(x) = \frac{2x+3}{x^2-1}$

18. $f(x) = \frac{x^2-1}{x^2-4}$

19. $f(x) = \frac{x-2}{\ln x}$

20. $f(x) = \frac{\ln x}{x-2}$

In problems 21 – 24, determine where each rational function is undefined. Determine whether an asymptote or a hole appears at such numbers.

21. $R(x) = \frac{x^3-x^2+x-1}{x^4-x^3+3x-3}$

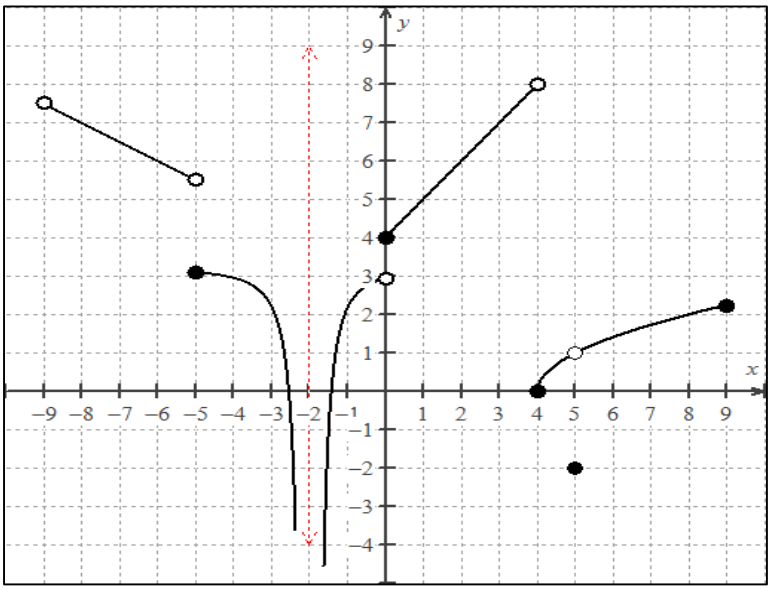
22. $R(x) = \frac{x^3-x^2+5x-5}{x^2+3x-4}$

23. $R(x) = \frac{3x^3+6x^2+3x}{x^4+x^3+2x+2}$

24. $R(x) = \frac{4x^2-4}{x^2+5x-6}$

Continuity Review Name _____

For problems 1 – 8, use the graph of $y = f(x)$.



1. What is the domain of f?

   $(-9, -2) \cup (-2, 9]$

2. What is the range of f?

   $(-\infty, 3] \cup [4, 8)$

3. Find $f(-5)$ and $f(5)$.

   $f(-5) = 3\,, f(5) = -2$

4. Find $f(0)$ and $f(4)$.

   $f(0) = 4\,, f(4) = 0$

5. Is f continuous at $x = -5$? Explain.

   No, there is a jump discontinuity at $x = -5$

6. Is f continuous at $x = 5$? Explain.

   No, there is a point discontinuity at $x = 5$

7. What type of discontinuity occurs at $x = -2$?

   At $x = -2$ there is an infinite discontinuity (vertical asymptote).

8. State the value of x where a point discontinuity occurs.

   There is a point discontinuity at $x = 5$

In problems 9 – 14, determine whether f is continuous at c.

9. $f(x) = x^3 - 2x^2 + 3x - 4, c = 2$

   Polynomials are ontinuous everywhere, f(2) = 2

10. $f(x) = \frac{x^2 + 5}{x - 4}\,, c = 3$

    Yes, $f(3) = -14$

11. $f(x) = \frac{x^3 + 2x}{x^2 - 2x}, c = 0$

    No, $f(0) = \frac{0}{0}$; f(0) does not exist

12. $f(x) = \frac{x^3 - 8}{x^2 + 4}\,, c = 2$

    Yes, $f(2) = 0$

13. $f(x) = \frac{x - 5}{x + 5}\,, c = -5$

    No, $f(-5) = \frac{-10}{0}$; $f(-5)$ does not exist

14. $f(x) = \begin{cases} \frac{x^2 + 3x}{x^2 - 3x} & if\ x \neq 0 \\ 2 & if\ x = 0 \end{cases}$

    No, $f(0) = 2$; point discontinuity

In problems 15 - 20, find the numbers at which *f* is continuous. At which numbers if *f* discontinuous?

15. $f(x) = -3\sin x$

The sine function is continuous everywhere.

16. $f(x) = 2\tan x$

$x \neq \frac{\pi}{2} \pm \pi n, n \in Z$

17. $f(x) = \frac{2x+3}{x^2-1}$

$x \neq -1, 1$

18. $f(x) = \frac{x^2-1}{x^2-4}$

$x \neq -2, 2$

19. $f(x) = \frac{x-2}{\ln x}$

$x \neq 1$ and any $x < 0$

20. $f(x) = \frac{\ln x}{x-2}$

$x \neq 2$ and any $x < 0$

In problems 21 – 24, determine where each rational function is undefined. Determine whether an asymptote or a hole appears at such numbers.

21. $R(x) = \frac{x^3 - x^2 + x - 1}{x^4 - x^3 + 3x - 3}$

There is a hole at $\left(1, \frac{1}{2}\right)$

22. $R(x) = \frac{x^3 - x^2 + 5x - 5}{x^2 + 3x - 4}$

There is a hole at $\left(1, \frac{6}{5}\right)$

23. $R(x) = \frac{3x^3 + 6x^2 + 3x}{x^4 + x^3 + 2x + 2}$

There is a hole at $(0, 0)$ and a vertical asymptote at $x = \sqrt[3]{-2}$

24. $R(x) = \frac{4x^2 - 4}{x^2 + 5x - 6}$

There is a hole at $\left(1, \frac{8}{7}\right)$ and a vertical asymptote at $x = -6$