Problem 1 *Let* $f(x) = \begin{cases} x^2 + 5\,x & , \quad x \leq -1 \\ x - 4 & , \quad -1 < x \leq 1 \\ (x+5)^2 - 39 & , \quad x > 1 \end{cases}$.

Find the numbers at which f is discontinuous: $x = \boxed{?}$
(If no such numbers exist, enter "None")

At which of these points of discontinuity is f continuous from the right?
$x = \boxed{?}$ *(If no such numbers exist, enter "None")*

At which of these points of discontinuity is f continuous from the left?
$x = \boxed{?}$ *(If no such numbers exist, enter "None")*

Problem 2 *Let* $f(x) = \begin{cases} (x+6)^2 & , \quad x < -2 \\ \sin(x) & , \quad -2 \leq x \leq 3 \\ x^2 + 5\,x - 6 & , \quad x > 3 \end{cases}$.

Find the numbers at which f is discontinuous: $x = \boxed{?}$
(If no such numbers exist, enter "None")

At which of these points of discontinuity is f continuous from the right?
$x = \boxed{?}$ *(If no such numbers exist, enter "None")*

At which of these points of discontinuity is f continuous from the left?
$x = \boxed{?}$ *(If no such numbers exist, enter "None")*

Problem 3 *Let* $f(x) = \begin{cases} (x+3)^2 & , \quad x < -2 \\ \cos(x) & , \quad -2 \leq x \leq 2 \\ -x - 3 & , \quad x > 2 \end{cases}$.

Find the numbers at which f is discontinuous: $x = \boxed{?}$
(If no such numbers exist, enter "None")

At which of these points of discontinuity is f continuous from the right?
$x = \boxed{?}$ *(If no such numbers exist, enter "None")*

At which of these points of discontinuity is f continuous from the left?
$x = \boxed{?}$ *(If no such numbers exist, enter "None")*

Problem 4 *Let* $f(x) = \begin{cases} -x + 6 & , \quad x < -3 \\ e^x & , \quad -3 \leq x \leq 1 \\ x^2 - 8\,x + 12 & , \quad x > 1 \end{cases}$.

Find the numbers at which f is discontinuous: $x = \boxed{?}$
(If no such numbers exist, enter "None")

At which of these points of discontinuity is f continuous from the right?
$x = \boxed{?}$ *(If no such numbers exist, enter "None")*

At which of these points of discontinuity is f continuous from the left?
$x = \boxed{?}$ *(If no such numbers exist, enter "None")*

Problem 5 *Let* $f(x) = \begin{cases} x-2 & , \quad x < 1 \\ e^{(x-4)} & , \quad 1 \le x \le 4 \\ (x-2)^2 & , \quad x > 4 \end{cases}$.

Find the numbers at which f is discontinuous: $x = \boxed{?}$
(If no such numbers exist, enter "None")

At which of these points of discontinuity is f continuous from the right?
$x = \boxed{?}$ *(If no such numbers exist, enter "None")*

At which of these points of discontinuity is f continuous from the left?
$x = \boxed{?}$ *(If no such numbers exist, enter "None")*

Problem 6 *Determine if the limit approaches a finite number, infinity, or does not exist. (If the limit does not exist, write DNE)*

$$\lim_{x \to -3} -2\,(x+4)(x+2)\tan\left(-2\,\pi x\right) = \boxed{?}$$

Problem 7 *Let* $f(x) = \begin{cases} x+5 & , \quad x \le 0 \\ (x-2)^2 & , \quad 0 < x \le 3 \\ x-2 & , \quad x > 3 \end{cases}$.

Find the numbers at which f is discontinuous: $x = \boxed{?}$
(If no such numbers exist, enter "None")

At which of these points of discontinuity is f continuous from the right?
$x = \boxed{?}$ *(If no such numbers exist, enter "None")*

At which of these points of discontinuity is f continuous from the left?
$x = \boxed{?}$ *(If no such numbers exist, enter "None")*

Problem 8 *Let* $f(x) = \begin{cases} x+5 & , \quad x \le 0 \\ -x+4 & , \quad 0 < x \le 5 \\ x-6 & , \quad x > 5 \end{cases}$.

Find the numbers at which f is discontinuous: $x = \boxed{?}$
(If no such numbers exist, enter "None")

At which of these points of discontinuity is f continuous from the right?
$x = \boxed{?}$ *(If no such numbers exist, enter "None")*

At which of these points of discontinuity is f continuous from the left?
$x = \boxed{?}$ *(If no such numbers exist, enter "None")*

Problem 9 *Let* $f(x) = \begin{cases} x^2-3 & , \quad x \le -2 \\ x^2-4 & , \quad -2 < x \le 1 \\ x-4 & , \quad x > 1 \end{cases}$.

Find the numbers at which f is discontinuous: $x = \boxed{?}$
(If no such numbers exist, enter "None")

At which of these points of discontinuity is f continuous from the right?
$x =$? *(If no such numbers exist, enter "None")*

At which of these points of discontinuity is f continuous from the left?
$x =$? *(If no such numbers exist, enter "None")*

Problem 10 *Let* $f(x) = \begin{cases} (x+3)^2 & , \quad x < 2 \\ \cos(x) & , \quad 2 \le x \le 4 \\ -x-3 & , \quad x > 4 \end{cases}$.

Find the numbers at which f is discontinuous: $x =$?
(If no such numbers exist, enter "None")

At which of these points of discontinuity is f continuous from the right?
$x =$? *(If no such numbers exist, enter "None")*

At which of these points of discontinuity is f continuous from the left?
$x =$? *(If no such numbers exist, enter "None")*

Problem 11 *Determine if the limit approaches a finite number, $\pm\infty$, or does not exist. (If the limit does not exist, write DNE)*

$$\lim_{x \to 3} \frac{x-2}{x^2 - 5x + 6} = \boxed{?}$$

Problem 12 *Determine if the limit approaches a finite number, infinity, or does not exist. (If the limit does not exist, write DNE)*

$$\lim_{x \to +\infty} \frac{x^3 - 5x^2 - 8x + 48}{x^3 - 3x^2 - 10x + 24} = \boxed{?}$$

Problem 13 *Determine if the limit approaches a finite number, infinity, or does not exist. (If the limit does not exist, write DNE)*

$$\lim_{x \to -\infty} \frac{x^3 - 7x^2 + 8x + 16}{x^3 - 9x^2 + 24x - 16} = \boxed{?}$$

Problem 14 *Determine if the limit approaches a finite number, infinity, or does not exist. (If the limit does not exist, write DNE)*

$$\lim_{x \to +\infty} \frac{x-1}{x^4 + 2x^3 - 27x^2 - 56x + 80} = \boxed{?}$$

Problem 15 *Determine if the limit approaches a finite number, infinity, or does not exist. (If the limit does not exist, write DNE)*

$$\lim_{x \to -\infty} \frac{x^3 + 4\,x^2 - 16\,x - 64}{x^2 + 6\,x + 9} = \boxed{?}$$