Part A - Multiple Choice

Question	Answer	Question	Answer
1	B	7	B
2	D	8	C
3	B*	9	D
4	C	10	B
5	D	11	D
6	C		

*3: B is the intended answer: 1/x decreases on each interval $(-\infty, 0)$ and $(0, \infty)$. It is not decreasing across its entire disconnected domain.

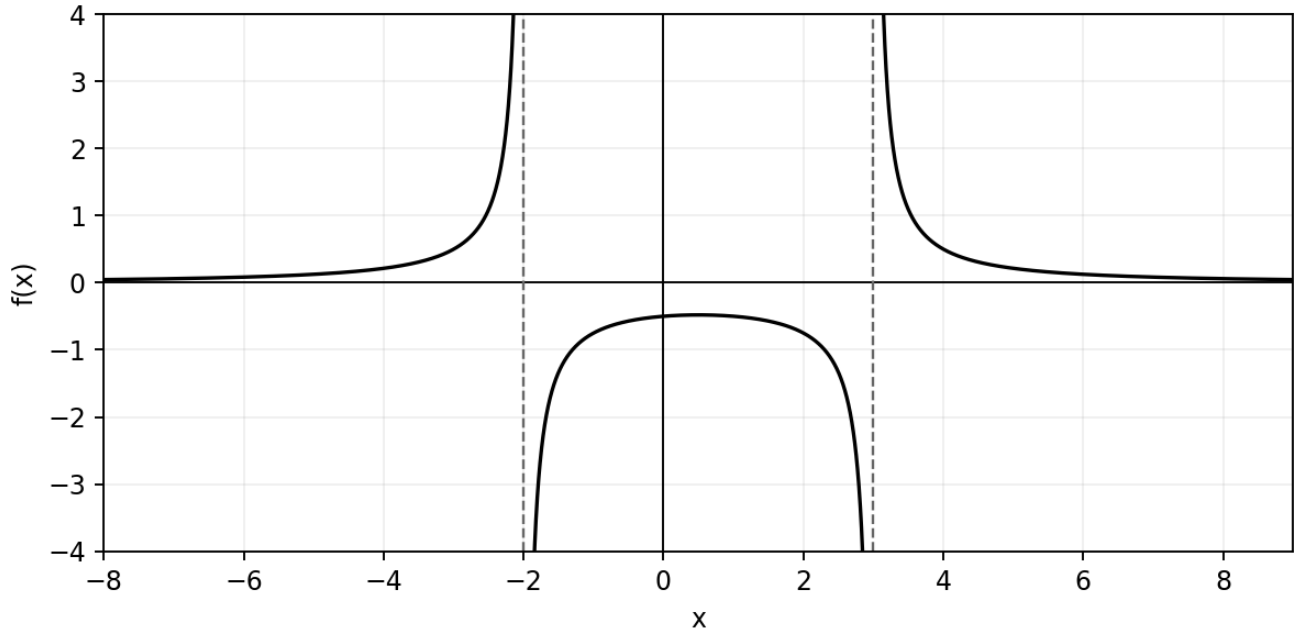
Part B - Applications

1a. $f(x) = 3/(x^2 - x - 6)$

Feature	Answer
i) Vertical asymptotes and tests	$x = -2$ and $x = 3$. $x \to -2^-$: $f(x) \to +\infty$; $x \to -2^+$: $f(x) \to -\infty$. $x \to 3^-$: $f(x) \to -\infty$; $x \to 3^+$: $f(x) \to +\infty$.
ii) Domain	$x \in \mathbb{R}$, $x \neq -2, 3$.
iii) Horizontal asymptote and tests	$y = 0$; $f(x) \to 0$ from above as $x \to \pm\infty$.
iv) Range	$(-\infty, -12/25] \cup (0, \infty)$.
v) Intercepts	No x-intercepts. y-intercept: $(0, -1/2)$.

Part B - Applications (continued)

1b. Graph



2a. Horizontal asymptote: **I = 4**. The current approaches 4 amperes from above as time increases.

2b. Domain: **t ∈ [0, ∞)**. Range: **I ∈ (4, 21]** amperes.

2c. 14 seconds.

3. x = 23/15.

4. [-4, -1) ∪ [3/2, 7).

Part C - Communication

1. Both graphs lie on y = x + 2. The graph of f has a hole at **(5, 7)**; g contains that point.
f: domain ℝ except 5; range ℝ except 7. g: domain and range ℝ.

2. f(x) = 3/[(x + 2)(x - 3)] = 3/(x^2 - x - 6).

Part D - Thinking, Inquiry and Problem Solving

Solution: (-3, -1) ∪ (4, ∞).

Graph feature	Answer
Vertical asymptotes	x = -1 and x = 4.
Horizontal asymptote	y = 0.
Intercepts	x-intercept: (-3, 0). y-intercept: (0, 3).
Asymptote tests	$x \to -1^-$: f(x) → -∞; $x \to -1^+$: f(x) → +∞. $x \to 4^-$: f(x) → +∞; $x \to 4^+$: f(x) → -∞. x → -∞: f(x) → 0 from above. x → +∞: f(x) → 0 from below.

