

In the spaces provided below, write the number (1 to 10) corresponding to which of the following was used to get from one line to the next. (1/2 point for each row.)

Limit laws

1. The limit of a sum is the sum of the limits
2. The limit of a difference is the difference of the limits
3. The limit of a constant times a function is the constant times the limit of the function
4. The limit of a product is the product of the limits
5. The limit of a quotient is the quotient of the limits
6. The limit of a root is the root of the limit

Special cases of limits

7. The limit of a constant is the constant
8. The limit of the function $f(x) = x$ as x approaches a is a

Algebraic operations

9. factorization
10. cancelation of common factors

$$\begin{aligned} & \lim_{x \rightarrow 1} \left(\frac{10(x^2 - 1)}{x^2 + 2x - 3} - \sqrt{\frac{2(x^2 + 2x - 3)}{x^2 - 1}} \right)^2 \\ &= \left(\lim_{x \rightarrow 1} \left(\frac{10(x^2 - 1)}{x^2 + 2x - 3} - \sqrt{\frac{2(x^2 + 2x - 3)}{x^2 - 1}} \right) \right)^2 \\ &= \left(\lim_{x \rightarrow 1} \left(\frac{10(x^2 - 1)}{x^2 + 2x - 3} \right) - \lim_{x \rightarrow 1} \left(\sqrt{\frac{2(x^2 + 2x - 3)}{x^2 - 1}} \right) \right)^2 \\ &= \left(\lim_{x \rightarrow 1} \left(\frac{10(x^2 - 1)}{x^2 + 2x - 3} \right) - \sqrt{\lim_{x \rightarrow 1} \left(\frac{2(x^2 + 2x - 3)}{x^2 - 1} \right)} \right)^2 \\ &= \left(\lim_{x \rightarrow 1} \left(\frac{10(x - 1)(x + 1)}{(x - 1)(x + 3)} \right) - \sqrt{\lim_{x \rightarrow 1} \left(\frac{2(x - 1)(x + 3)}{(x - 1)(x + 1)} \right)} \right)^2 \\ &= \left(\lim_{x \rightarrow 1} \left(\frac{10(x + 1)}{(x + 3)} \right) - \sqrt{\lim_{x \rightarrow 1} \left(\frac{2(x + 3)}{(x + 1)} \right)} \right)^2 \\ &= \left(\left(\frac{\lim_{x \rightarrow 1} (10(x + 1))}{\lim_{x \rightarrow 1} (x + 3)} \right) - \sqrt{\left(\frac{\lim_{x \rightarrow 1} (2(x + 3))}{\lim_{x \rightarrow 1} (x + 1)} \right)} \right)^2 \\ &= \left(\left(\frac{10 \lim_{x \rightarrow 1} (x + 1)}{\lim_{x \rightarrow 1} (x + 3)} \right) - \sqrt{\left(\frac{2 \lim_{x \rightarrow 1} (x + 3)}{\lim_{x \rightarrow 1} (x + 1)} \right)} \right)^2 \\ &= \left(\left(\frac{10(\lim_{x \rightarrow 1} x + \lim_{x \rightarrow 1} 1)}{\lim_{x \rightarrow 1} x + \lim_{x \rightarrow 1} 3} \right) - \sqrt{\left(\frac{2(\lim_{x \rightarrow 1} x + \lim_{x \rightarrow 1} 3)}{\lim_{x \rightarrow 1} x + \lim_{x \rightarrow 1} 1} \right)} \right)^2 \\ &= \left(\left(\frac{10(\lim_{x \rightarrow 1} x + 1)}{\lim_{x \rightarrow 1} x + 3} \right) - \sqrt{\left(\frac{2(\lim_{x \rightarrow 1} x + 3)}{\lim_{x \rightarrow 1} x + 1} \right)} \right)^2 \\ &= \left(\left(\frac{10(1 + 1)}{(1 + 3)} \right) - \sqrt{\left(\frac{2(1 + 3)}{(1 + 1)} \right)} \right)^2 = (5 - 2)^2 = 9 \end{aligned}$$

In the spaces provided below, write the number (1 to 10) corresponding to which of the following was used to get from one line to the next. (1 point for each row.)

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$\lim_{x \rightarrow 2} \sqrt{\left(\frac{(x^2 - 2x)}{2(x^2 - 3x + 2)} + x(6 - x)\right)}$	}	<input style="width: 100%; height: 30px;" type="text"/>
$= \sqrt{\lim_{x \rightarrow 2} \left(\frac{(x^2 - 2x)}{2(x^2 - 3x + 2)} + x(6 - x)\right)}$	}	<input style="width: 100%; height: 30px;" type="text"/>
$= \sqrt{\lim_{x \rightarrow 2} \left(\frac{(x^2 - 2x)}{2(x^2 - 3x + 2)}\right) + \lim_{x \rightarrow 2} (x(6 - x))}$	}	<input style="width: 100%; height: 30px;" type="text"/>
$= \sqrt{\lim_{x \rightarrow 2} \left(\frac{x(x - 2)}{2(x - 1)(x - 2)}\right) + \lim_{x \rightarrow 2} (x(6 - x))}$	}	<input style="width: 100%; height: 30px;" type="text"/>
$= \sqrt{\lim_{x \rightarrow 2} \left(\frac{x}{2(x - 1)}\right) + \lim_{x \rightarrow 2} (x(6 - x))}$	}	<input style="width: 100%; height: 30px;" type="text"/>
$= \sqrt{\lim_{x \rightarrow 2} \left(\frac{x}{2(x - 1)}\right) + (\lim_{x \rightarrow 2} x)(\lim_{x \rightarrow 2} (6 - x))}$	}	<input style="width: 100%; height: 30px;" type="text"/>
$= \sqrt{\left(\frac{\lim_{x \rightarrow 2} x}{\lim_{x \rightarrow 2} 2(x - 1)}\right) + (\lim_{x \rightarrow 2} x)(\lim_{x \rightarrow 2} (6 - x))}$	}	<input style="width: 100%; height: 30px;" type="text"/>
$= \sqrt{\left(\frac{\lim_{x \rightarrow 2} x}{2 \lim_{x \rightarrow 2} (x - 1)}\right) + (\lim_{x \rightarrow 2} x)(\lim_{x \rightarrow 2} (6 - x))}$	}	<input style="width: 100%; height: 30px;" type="text"/>
$= \sqrt{\left(\frac{\lim_{x \rightarrow 2} x}{2(\lim_{x \rightarrow 2} x - \lim_{x \rightarrow 2} 1)}\right) + (\lim_{x \rightarrow 2} x)(\lim_{x \rightarrow 2} 6 - \lim_{x \rightarrow 2} x)}$	}	<input style="width: 100%; height: 30px;" type="text"/>
$= \sqrt{\frac{(\lim_{x \rightarrow 2} x)}{2(\lim_{x \rightarrow 2} x - 1)} + (\lim_{x \rightarrow 2} x)(6 - \lim_{x \rightarrow 2} x)}$	}	<input style="width: 100%; height: 30px;" type="text"/>
$= \sqrt{\left(\frac{2}{2(2-1)} + 2(6 - 2)\right)} = \sqrt{(1 + 8)} = 3$	}	<input style="width: 100%; height: 30px;" type="text"/>