

Limits Practice

With the techniques we have developed, we can now evaluate many different types of limits. Below is a large collection of limit problems each pulled directly from the old exam archives. For each problem, evaluate the limit and give justification. See if you can do these quickly. Solutions are posted online.

$$1. \lim_{x \rightarrow A} \frac{\frac{1}{x} - \frac{1}{A}}{x - A}$$

$$2. \lim_{x \rightarrow 8} \frac{\sqrt{x-4} + 2}{x - 3}$$

$$3. \lim_{x \rightarrow -2^-} \frac{|x + 2|}{x^2 + 7x + 10}$$

$$4. \lim_{x \rightarrow \infty} (x - \sqrt{x^2 + 4x})$$

$$5. \lim_{x \rightarrow 2} \frac{x^2 + x - 6}{x - 2}$$

$$6. \lim_{x \rightarrow 3} \frac{x^2 - 4x + 3}{x^2 + 4x - 21}$$

$$7. \lim_{x \rightarrow 2} \frac{\sqrt{x^2 + 4} - \sqrt{8}}{x^2 - 4}$$

$$8. \lim_{\theta \rightarrow 0} \frac{\sin(13\theta)}{4\theta}$$

$$9. \lim_{t \rightarrow \pi/2} \frac{\sin(t) + \sqrt{\sin^2(t) + 2 \cos^2(t)}}{2 \cos^2(t)}$$

$$10. \lim_{x \rightarrow 0} \frac{x^3 - 8}{\cos^2(x)}$$

$$11. \lim_{t \rightarrow 0} \left(\frac{1}{t\sqrt{1+t}} - \frac{1}{t} \right)$$

$$12. \lim_{r \rightarrow 0} \frac{3r^2}{3 - \sqrt{9 - r^2}}$$

$$13. \lim_{x \rightarrow 0} \frac{e^x \sin(3x) + 5 \sin(3x)}{x}$$

$$14. \lim_{x \rightarrow 2^-} \frac{e^x}{2 - x}$$

$$15. \lim_{x \rightarrow \infty} (x - \sqrt{x^2 + 3})$$

$$16. \lim_{t \rightarrow 3} \frac{\frac{1}{3} - \frac{3}{t^2}}{t - 3}$$

$$17. \lim_{x \rightarrow 2} \frac{\sqrt{x^2 + 12}}{(x - 2)^2}$$

$$18. \lim_{x \rightarrow 0^+} \frac{1 + x}{e^{x^2 - x} - 1}$$

$$22. \lim_{x \rightarrow 3} \frac{\sqrt{x^2 - 9}}{\sqrt{2x - 6}}$$

$$23. \lim_{x \rightarrow 0^-} \frac{|x - |x||}{|2x - |x||}$$

$$24. \lim_{x \rightarrow 0} \frac{\sin(2x)}{x}$$

$$25. \lim_{x \rightarrow 3^+} \frac{x + e^x}{(3 - x)e^x}$$

$$26. \lim_{t \rightarrow 0} \left(\frac{1}{2t\sqrt{1+2t}} - \frac{1}{2t} \right)$$

$$27. \lim_{x \rightarrow \infty} \frac{3x^{10} + x^8 + 3}{x^{10} - 3x^6 + 2}$$

$$28. \lim_{x \rightarrow 1} \frac{e^x + 7}{(x - 1)^3}$$

$$29. \lim_{x \rightarrow 5} \frac{(x^2 - 25)\sin(x)}{(x - 5)\cos(x)}$$

$$30. \lim_{x \rightarrow 0} \frac{x}{\sqrt{x+4} - 2}$$