

En utilisant le théorème $\lim_{x \rightarrow 0} \frac{\sin(x)}{x} = 1$, calculez les limites suivantes (x en radians !) :

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|---|---|
| 1. $\lim_{x \rightarrow 0} \frac{\sin(3x)}{x}$ | 2. $\lim_{x \rightarrow 0} \frac{\sin(3x)}{2x}$ |
| 3. $\lim_{x \rightarrow 0} \frac{\sin(x/3)}{2x}$ | 4. $\lim_{x \rightarrow 0} \frac{\sin(ax)}{x}$ |
| 5. $\lim_{x \rightarrow 0} \frac{\tan(ax)}{x}$ | 6. $\lim_{x \rightarrow 0} \frac{\sin(2x)}{\sin(3x)}$ |
| 7. $\lim_{x \rightarrow 0} \frac{\sin(x)}{x^2}$ | 8. $\lim_{x \rightarrow 0} \frac{\sin(x^2)}{x}$ |
| 9. $\lim_{x \rightarrow 0} \frac{\tan(x)}{x^2}$ | 10. $\lim_{x \rightarrow 0} \frac{\tan(5x)}{\sin(3x)}$ |
| 11. $\lim_{x \rightarrow 1} \frac{\sin(x-1)}{x-1}$ | 12. $\lim_{x \rightarrow \pi/2} \frac{\cos(x)}{x - \pi/2}$ |
| 13. $\lim_{x \rightarrow 0} \frac{\sin(x)}{x^2 + x}$ | 14. $\lim_{x \rightarrow 0} \frac{2 \tan(x) + \sin(x)}{x}$ |
| 15. $\lim_{x \rightarrow 0} \frac{\sin(x^2 - 2x)}{x^2 - 2x}$ | 16. $\lim_{x \rightarrow 1} \frac{\sin(x^2 - 2x)}{x^2 - 2x}$ |
| 17. $\lim_{x \rightarrow 2} \frac{\sin(x^2 - 2x)}{x^2 - 2x}$ | 18. $\lim_{x \rightarrow 3} \frac{\sin(x^2 - 2x)}{x^2 - 2x}$ |
| 19. $\lim_{x \rightarrow a} \frac{\sin(x) - \sin(a)}{x - a}$ | 20. $\lim_{x \rightarrow a} \frac{\cos(x) - \cos(a)}{x - a}$ |
| 21. $\lim_{h \rightarrow 0} \frac{\sin(a+h) - \sin(a)}{h}$ | 22. $\lim_{h \rightarrow 0} \frac{\cos(a+h) - \cos(a)}{h}$ |

Les réponses se trouvent au dos...

Réponses, sans justifications !

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| 1. $\lim_{x \rightarrow 0} \frac{\sin(3x)}{x} = 3$ | 2. $\lim_{x \rightarrow 0} \frac{\sin(3x)}{2x} = 3 / 2 = 1,5$ |
| 3. $\lim_{x \rightarrow 0} \frac{\sin(x/3)}{2x} = 1 / 6$ | 4. $\lim_{x \rightarrow 0} \frac{\sin(ax)}{x} = a$ |
| 5. $\lim_{x \rightarrow 0} \frac{\tan(ax)}{x} = a$ | 6. $\lim_{x \rightarrow 0} \frac{\sin(2x)}{\sin(3x)} = 2 / 3$ |
| 7. $\lim_{x \rightarrow 0} \frac{\sin(x)}{x^2} = \pm\infty$, donc limite n'existe pas. | 8. $\lim_{x \rightarrow 0} \frac{\sin(x^2)}{x} = 0$ |
| 9. $\lim_{x \rightarrow 0} \frac{\tan(x)}{x^2} = \pm\infty$, donc limite n'existe pas. | 10. $\lim_{x \rightarrow 0} \frac{\tan(5x)}{\sin(3x)} = 5 / 3$ |
| 11. $\lim_{x \rightarrow 1} \frac{\sin(x-1)}{x-1} = 1$ | 12. $\lim_{x \rightarrow \pi/2} \frac{\cos(x)}{x - \pi/2} = -1$ |
| 13. $\lim_{x \rightarrow 0} \frac{\sin(x)}{x^2 + x} = 1$ | 14. $\lim_{x \rightarrow 0} \frac{2 \tan(x) + \sin(x)}{x} = 3$ |
| 15. $\lim_{x \rightarrow 0} \frac{\sin(x^2 - 2x)}{x^2 - 2x} = 1$ | 16. $\lim_{x \rightarrow 1} \frac{\sin(x^2 - 2x)}{x^2 - 2x} = \sin(1)$, limite immédiate ! |
| 17. $\lim_{x \rightarrow 2} \frac{\sin(x^2 - 2x)}{x^2 - 2x} = 1$ | 18. $\lim_{x \rightarrow 3} \frac{\sin(x^2 - 2x)}{x^2 - 2x} = \sin(3) / 3$, limite immédiate ! |
| 19. $\lim_{x \rightarrow a} \frac{\sin(x) - \sin(a)}{x - a} = \cos(a)$ | 20. $\lim_{x \rightarrow a} \frac{\cos(x) - \cos(a)}{x - a} = -\sin(a)$ |
| 21. $\lim_{h \rightarrow 0} \frac{\sin(a+h) - \sin(a)}{h} = \cos(a)$ | 22. $\lim_{h \rightarrow 0} \frac{\cos(a+h) - \cos(a)}{h} = -\sin(a)$ |