

AP Calculus

2.1: Definition of the derivative

Evaluate the limit.

1)	$\lim_{h \rightarrow 0} \frac{7(x+h) + 32 - (7x + 32)}{h}$	7)	$\lim_{x \rightarrow 0} \frac{\sec x - 1}{x}$
2)	$\lim_{h \rightarrow 0} \frac{\sqrt{x+h} - \sqrt{x}}{h}$	8)	$\lim_{h \rightarrow 0} \frac{\tan(2x+h) - \tan(2x)}{h}$
3)	$\lim_{h \rightarrow 0} \frac{\cos(x+h) - \cos x}{h}$	9)	$\lim_{h \rightarrow 0} \frac{(x+h)^3 - (x^3)}{h}$
4)	$\lim_{x \rightarrow 4} \frac{x^{\frac{3}{2}} - 8}{x - 4}$	10)	$\lim_{\Delta x \rightarrow 0} \frac{[(x + \Delta x)^3 - 12(x + \Delta x)] - [x^3 - 12x]}{\Delta x}$
5)	$\lim_{x \rightarrow 2} \frac{(x^3 + 6x) - 20}{x - 2}$	11)	$\lim_{\Delta x \rightarrow 0} \frac{[(x + \Delta x)^3 + 1] - (x^3 + 1)}{\Delta x}$
6)	$\lim_{h \rightarrow 0} \frac{3(x+h)^5 - 2(x+h)^3 + 6 - (3x^5 - 2x^3 + 6)}{h}$	12)	$\lim_{x \rightarrow \frac{\pi}{6}} \frac{2 \sin 5x - 1}{x - \frac{\pi}{6}}$

Answers

1. 7
2. $\frac{1}{2\sqrt{x}}$
3. $-\sin x$
4. 3
5. 18
6. $15x^4 - 6x^2$

7. 0
8. $2 \sec^2 2x$
9. $3x^2$
10. $3x^2 - 12$
11. $3x^2$
12. $-5\sqrt{3}$