AP Calculus
2.1: Definition of the derivative

Evaluate the limit.

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

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. $-5\sqrt{3}$