

Name : _____

Score : _____

Teacher : _____

Date : _____

Limits and the Derivative Definition

Find each limit.

$$1) \lim_{h \rightarrow 0} \frac{-5(8+h)^3 + 5(8)^3}{h}$$

$$2) \lim_{h \rightarrow 0} \frac{1}{h} \left(\frac{-4}{\left(\frac{4}{3} + h\right)^3} + \frac{4}{\left(\frac{4}{3}\right)^3} \right)$$

$$3) \lim_{h \rightarrow 0} \frac{1}{h} \left(\frac{5}{(2+h)^3} - \frac{5}{(2)^3} \right)$$

$$4) \lim_{h \rightarrow 0} \frac{2\left(\frac{8}{5} + h\right)^4 - 2\left(\frac{8}{5}\right)^4}{h}$$

$$5) \lim_{h \rightarrow 0} \frac{1}{h} \left(\frac{-3}{\left(\frac{1}{2} + h\right)^3} + \frac{3}{\left(\frac{1}{2}\right)^3} \right)$$

$$6) \lim_{h \rightarrow 0} \frac{4\left(\frac{4}{3} + h\right)^2 - 4\left(\frac{4}{3}\right)^2}{h}$$

$$7) \lim_{h \rightarrow 0} \frac{5\tan(\pi + h) - 5\tan(\pi)}{h}$$

$$8) \lim_{h \rightarrow 0} \frac{-3\cos\left(\frac{3}{4}\pi + h\right) + 3\cos\left(\frac{3}{4}\pi\right)}{h}$$

$$9) \lim_{h \rightarrow 0} \frac{\left(\frac{7}{3} + h\right)^5 - \left(\frac{7}{3}\right)^5}{h}$$

$$10) \lim_{h \rightarrow 0} \frac{-\cos\left(\frac{1}{4}\pi + h\right) + \cos\left(\frac{1}{4}\pi\right)}{h}$$



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Find each limit.

$$1) \lim_{h \rightarrow 0} \frac{-5(8+h)^3 + 5(8)^3}{h}$$

-960

$$2) \lim_{h \rightarrow 0} \frac{1}{h} \left(\frac{-4}{\left(\frac{4}{3} + h\right)^3} + \frac{4}{\left(\frac{4}{3}\right)^3} \right)$$

$\frac{243}{64}$

$$3) \lim_{h \rightarrow 0} \frac{1}{h} \left(\frac{5}{(2+h)^3} - \frac{5}{(2)^3} \right)$$

$\frac{-15}{16}$

$$4) \lim_{h \rightarrow 0} \frac{2\left(\frac{8}{5} + h\right)^4 - 2\left(\frac{8}{5}\right)^4}{h}$$

$\frac{4096}{125}$

$$5) \lim_{h \rightarrow 0} \frac{1}{h} \left(\frac{-3}{\left(\frac{1}{2} + h\right)^3} + \frac{3}{\left(\frac{1}{2}\right)^3} \right)$$

144

$$6) \lim_{h \rightarrow 0} \frac{4\left(\frac{4}{3} + h\right)^2 - 4\left(\frac{4}{3}\right)^2}{h}$$

$\frac{32}{3}$

$$7) \lim_{h \rightarrow 0} \frac{5\tan(\pi + h) - 5\tan(\pi)}{h}$$

5

$$8) \lim_{h \rightarrow 0} \frac{-3\cos\left(\frac{3}{4}\pi + h\right) + 3\cos\left(\frac{3}{4}\pi\right)}{h}$$

$\frac{3\sqrt{2}}{2}$

$$9) \lim_{h \rightarrow 0} \frac{\left(\frac{7}{3} + h\right)^5 - \left(\frac{7}{3}\right)^5}{h}$$

$\frac{12005}{81}$

$$10) \lim_{h \rightarrow 0} \frac{-\cos\left(\frac{1}{4}\pi + h\right) + \cos\left(\frac{1}{4}\pi\right)}{h}$$

$\frac{\sqrt{2}}{2}$

