APPROXIMATIONS OF TRIGONOMETRIC FUNCTIONS WHEN x IS SMALL

1 Evaluate the following limits.

(a) $\lim_{x\to 0}\frac{\sin 2x}{x}$ **(b)** $\lim_{x\to 0}\frac{\sin x}{3x}$ **(c)** $\lim_{\theta\to 0}\frac{\sin 5\theta}{2\theta}$ **(d)** $\lim_{x\to 0}\frac{\tan 2x}{2x}$

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(e) $\lim_{x\to 0} \frac{\sin \frac{x}{2}}{x}$

(f) $\lim_{x\to 0} \frac{\sin \frac{x}{3}}{3x}$

(g) $\lim_{x\to 0} \frac{\tan 3x}{x}$

(h) $\lim_{x\to 0} \frac{3\sin 2x}{4x}$

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2 Indicate whether each statement is correct or incorrect.

(a) $\sin(\pi - x) = -\sin x$ **(b)** $\sin(\pi - x) = \sin x$ **(c)** $\lim_{x \to 0} \frac{\sin(\pi - x)}{x} = -1$ **(d)** $\lim_{x \to 0} \frac{\sin(\pi - x)}{x} = 1$

3 Evaluate the following limits.

(a) $\lim_{x \to 0} \frac{1 - \cos 2x}{x^2}$ **(b)** $\lim_{h \to 0} \frac{\tan 2h}{3h}$ **(c)** $\lim_{\theta \to 0} \frac{1 - \cos \theta}{\theta^2}$ **(d)** $\lim_{x \to 0} \frac{\sin^2 x}{x}$

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(e) $\lim_{x\to 0}\dfrac{\sin(\pi+x)}{x}$ **(f)** $\lim_{x\to 0}\dfrac{\cos\left(\frac{\pi}{2}-x\right)}{x}$ **(g)** $\lim_{x\to 0}\dfrac{1-\sin\left(\frac{\pi}{2}-x\right)}{x^2}$ **(h)** $\lim_{x\to 0}\dfrac{2\sin\frac{x}{2}}{x}$