

1. Use the following

- limit laws

$$\lim_{x \rightarrow a} (f(x) \pm g(x)) = \lim_{x \rightarrow a} f(x) \pm \lim_{x \rightarrow a} g(x),$$
$$\lim_{x \rightarrow a} (f(x)g(x)) = \lim_{x \rightarrow a} f(x) \lim_{x \rightarrow a} g(x),$$

- the fact that

$$\lim_{x \rightarrow 0} \sin(x) = 0, \quad \lim_{x \rightarrow 0} \cos(x) = 1,$$

- the trigonometric laws

$$\sin(x + h) = \sin(x) \cos(h) + \cos(x) \sin(h),$$
$$\cos(x + h) = \cos(x) \cos(h) - \sin(x) \sin(h)$$

to show that sine and cosine functions has the direct substitution property

$$\lim_{x \rightarrow a} \sin(x) = \sin(a),$$
$$\lim_{x \rightarrow a} \cos(x) = \cos(a),$$

(Hint:  $\lim_{x \rightarrow a} \sin(x) = \lim_{h \rightarrow 0} \sin(a + h)$ )