$U_1 = \cos x$, $U_2 = \sin 2x$ are the first two terms of a geometric sequence, $-\frac{\pi}{2} < x < \frac{\pi}{2}$

a) Find U_3

b) Find the set of values of x for which the geometric series converges

a) $\qquad\qquad\qquad\qquad$ $\sin 2x \equiv 2\sin x \cos x$

$U_1 = \cos x$
$U_2 = 2\sin x \cos x$

$$r = \frac{U_2}{U_1}$$

$$r = \frac{2\sin x \cos x}{\cos x}$$
$r = 2\sin x$

$U_3 = U_2 \times r$
$U_3 = 2\sin x \cos x \times 2\sin x$
$U_3 = 4\sin^2 x \cos x$
$U_3 = 4(1 - \cos^2 x)\cos x$
$U_3 = 4 - 4\cos^3 x$

b) $\qquad\qquad\qquad\qquad$ For a convergent series $-1 < r < 1$

$-1 < 2\sin x < 1$

$-0.5 < \sin x < 0.5$

$\qquad\qquad\qquad\qquad$ Consider the graph of $y = \sin x$

$$-\frac{\pi}{6} < x < \frac{\pi}{6}$$