## Answer on Question #45204, Engineering, Other

**Task:** 1) Show that $\cos A \cdot \cos B = 0.5(\cos(A+B) + \cos(A+B))$ . Some English is essential in addition to the algebra. Note that cosine is an even function so that cos(A-B) = cos(BA).
2) A mixer has a local oscillator at 1157 kHz and a bandpass filter centered at 455 kHz. What are the center frequencies of signals which would cause output from the filter? How is it that a radio receiver accepts only one channel of input signal?

**Solution:**

**1)**

$$\cos(A+B) = \cos A \cos B - \sin A \sin B$$
$$\cos(A-B) = \cos A \cos B + \sin A \sin B \Rightarrow$$
$$0.5(\cos(A+B) + \cos(A+B)) = \cos A \cos B - \sin A \sin B + \cos A \cos B + \sin A \sin B =$$
$$= 0.5 \cdot 2 \cos A \cos B = \cos A \cos B \Rightarrow$$
$$\cos A \cos B = \cos A \cos B$$

So, we show that $\cos A \cdot \cos B = 0.5(\cos(A+B) + \cos(A+B))$

2) What are the center frequencies of signals which would cause output from the filter?
Answer: $f_{cf} = f_l - f_c = 1157 - 455 = 702 kHz$