Solution of ECE 315 Test 2 F06

1. Classify the following functions as even, odd or neither by circling the correct classification.

(a) $\cos(2\pi t)\,\mathrm{tri}(t-1)$ Even Odd [Neither]

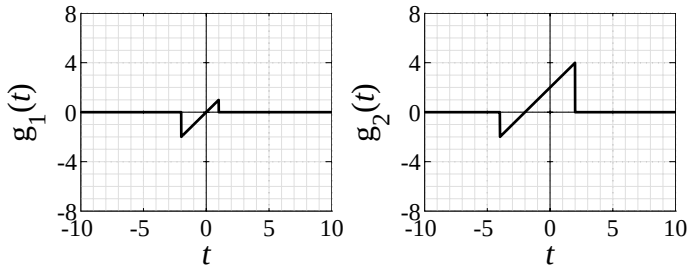
Cosine is even but the shifted triangle is neither even nor odd which means it has a non-zero even part and a non-zero odd part. So the product also has a non-zero even part and a non-zero odd part.

(b) $\sin(2\pi t)\,\mathrm{rect}(t/5)$ Even [Odd] Neither

Sine is odd and rectangle is even. Therefore the product is odd.

2. If $g_2(t) = A\,g_1\left(w(t-t_0)\right)$ graph $g_2(t)$ on the right.

A = -2, t_0 = -2, w = -1/2



3. What is the numerical value of the fundamental period of

$$g(t) = 3\cos(45\pi t) - 5\sin(50\pi t)\ ?$$

T_0 = <u>0.4</u>

The two fundamental frequencies of the two individual sinusoids are 22.5 and 25. The GCD of those is 2.5 which is the fundamental frequency of $g(t)$. Therefore the fundamental period of $g(t)$ is $1/2.5 = 0.4$.

Solution of ECE 315 Test 2 F06

1. Classify the following functions as even, odd or neither by circling the correct classification.

   (a) $\cos(2\pi t)\,\mathrm{tri}(t/5)$ [Even] Odd Neither

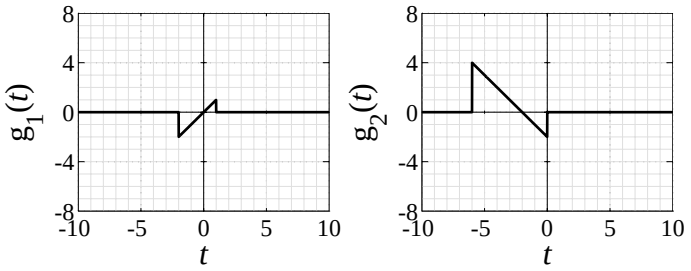
   Cosine is even and the scaled triangle is also even. So the product is even.

   (b) $\sin(2\pi t)\,\mathrm{rect}(t-2)$ Even Odd [Neither]

   Sine is odd and the shifted rectangle is neither even nor odd, meaning it has a non-zero even part and a non-zero odd part. Therefore the product is neither even nor odd.

2. If $g_2(t) = A\,g_1\left(w\left(t - t_0\right)\right)$ graph $g_2(t)$ on the right.

   A = -2, t_0 = -2, w = 1/2



3. What is the numerical value of the fundamental period of

$$g(t) = 3\cos(75\pi t) - 5\sin(90\pi t)\ ?$$

T_0 = 0.1333...

The two fundamental frequencies of the two individual sinusoids are 37.5 and 45. The GCD of those is 7.5 which is the fundamental frequency of $g(t)$. Therefore the fundamental period of $g(t)$ is $1/7.5 = 0.1333...$.

Solution of ECE 315 Test 2 F06

1. Classify the following functions as even, odd or neither by circling the correct classification.

(a) $\cos(2\pi t)\text{sgn}(t/5)$ Even **Odd** Neither

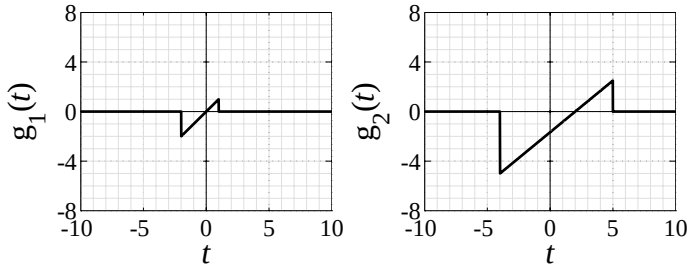
Cosine is even and the sgn is odd. So the product is odd.

(b) $\sin(2\pi t)\sin(12\pi t)$ **Even** Odd Neither

Sine is odd. Therefore the product two sines is even.

2. If $g_2(t) = Ag_1(w(t-t_0))$ graph $g_2(t)$ on the right.

A = 2.5, t_0 = 2, w = 1/3



3. What is the numerical value of the fundamental period of

$$g(t) = 3\cos(30\pi t) - 5\sin(39\pi t) \ ?$$

T_0 = 0.6666...

The two fundamental frequencies of the two individual sinusoids are 15 and 19.5. The GCD of those is 1.5 which is the fundamental frequency of $g(t)$. Therefore the fundamental period of $g(t)$ is $1/1.5 = 0.6666...$.