CT6-1. Consider:

$$\exp[i\alpha] \cdot \exp[i\beta] = \exp[i(\alpha+\beta)] \quad \text{where } \alpha, \beta \text{ real}$$

which implies:

$$[\cos\alpha + i\sin\alpha]\cdot[\cos\beta + i\sin\beta] = \cos(\alpha+\beta) + i\sin(\alpha+\beta)$$

Which of the following trig identities is correct?

A) $\cos(\alpha+\beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$

B) $\cos(\alpha+\beta) = \cos\alpha\sin\beta + \sin\alpha\cos\beta$

C) $\cos(\alpha+\beta) = \cos^2\alpha - \sin^2\beta$

D) $\sin(\alpha+\beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$

E) $\sin(\alpha+\beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$

2/25/2011

CT6-2.

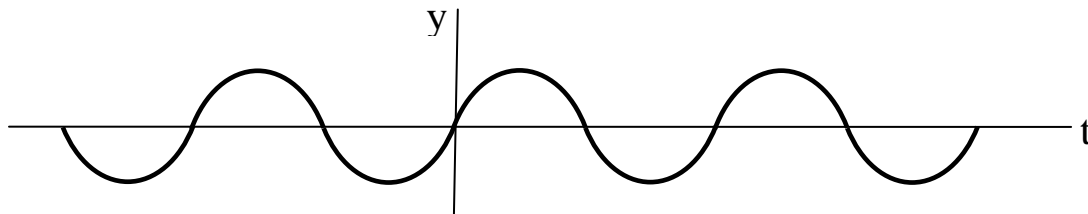Consider the function $f(t) = A \sin(2\pi t / T)$

How many of the following statements are correct?

I. $\displaystyle\int_{-0.5T}^{+0.5T} f(t)dt = 0$

II. $\displaystyle\int_{-0.75T}^{+0.75T} f(t)dt = 0$
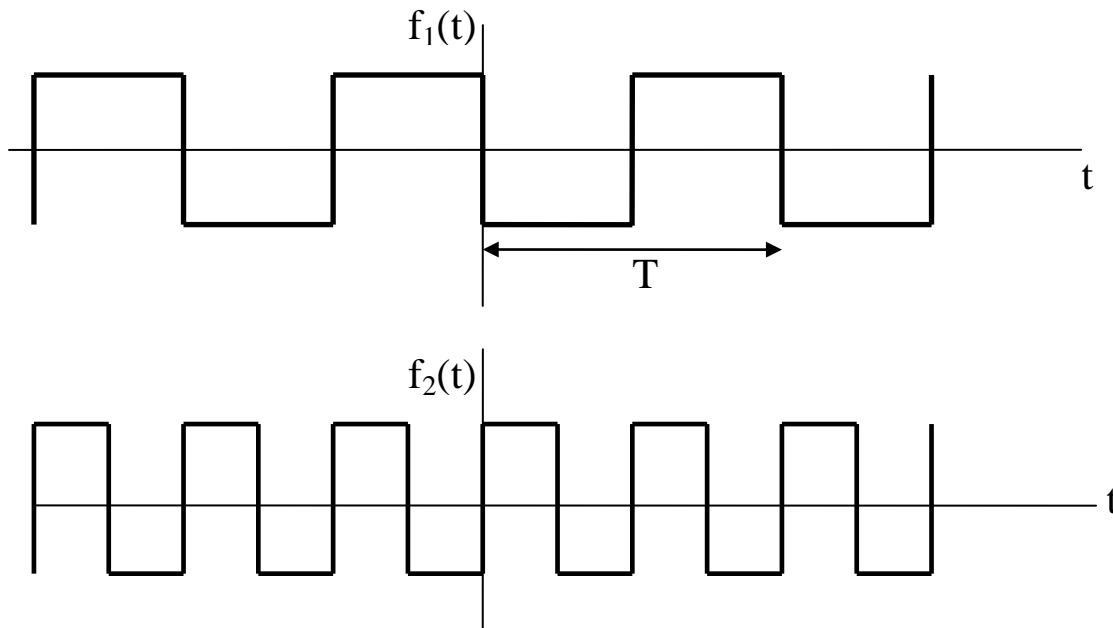
III. $\displaystyle\int_{0}^{+T} f(t)dt = 0$

IV. $\displaystyle\int_{0}^{+1.5T} f(t)dt = 0$

A) All are true
B) Exactly 1 is true
C) Exactly 2 are true
D) Exactly 3 are true
E) Answer depends on the period T

CT6-3. Consider the following two square wave functions f_1 and f_2

$f_1(t)$

T

$f_2(t)$

t

Notice that the period T of f_1 is twice the period of f_2. What can you say about the value of the integral $\int_0^T f_1(t) \cdot f_2(t)\, dt$?

A) The integral is positive.   B) It is negative.
C) The integral is zero.
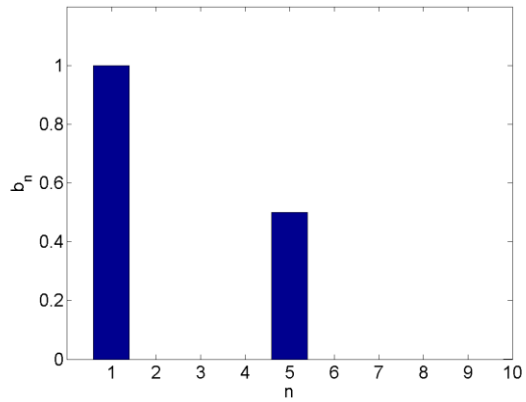D) The value depends on the period T.

E) Answer depends on the period T

CT6-4. Match the plot on the right (a periodic function of time) to the correct plot below of the Fourier coefficients. In other words, $x(t)=b_1\sin(t)+b_2\sin(2t)+b_3\sin(3t)+\ldots$ Pick the plot below that shows the correct first few Fourier coefficients b_n.
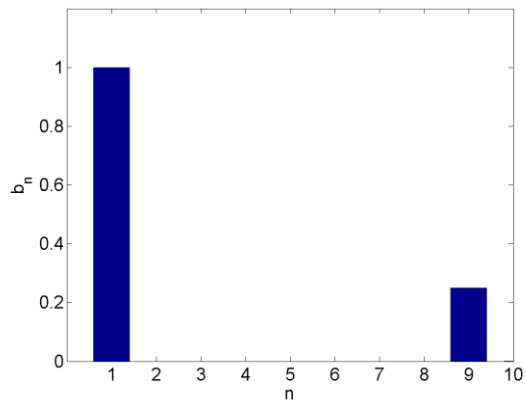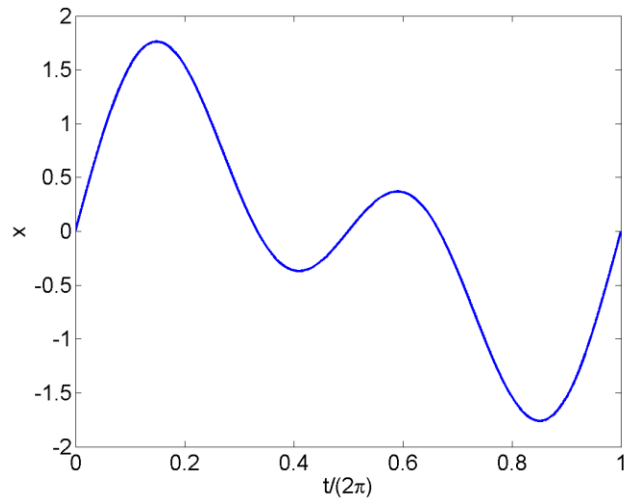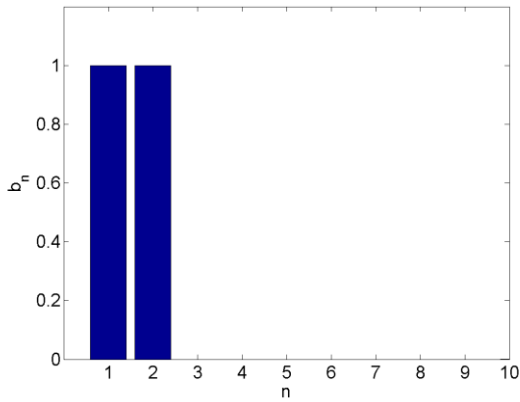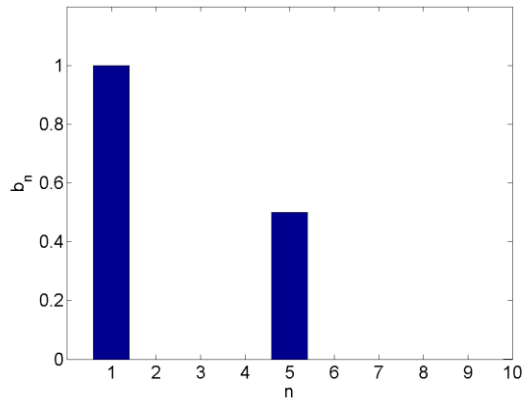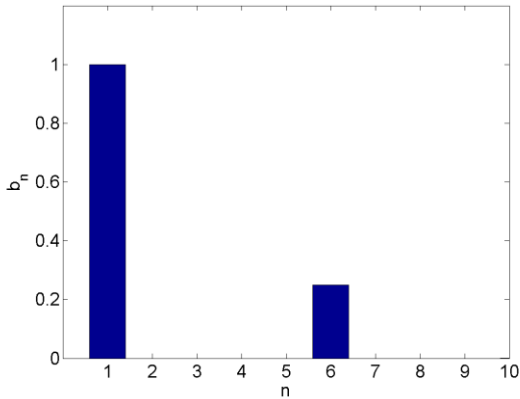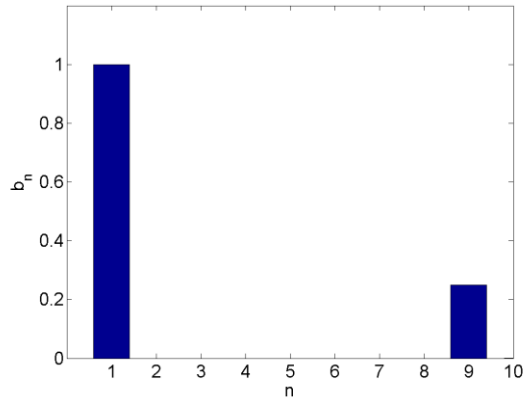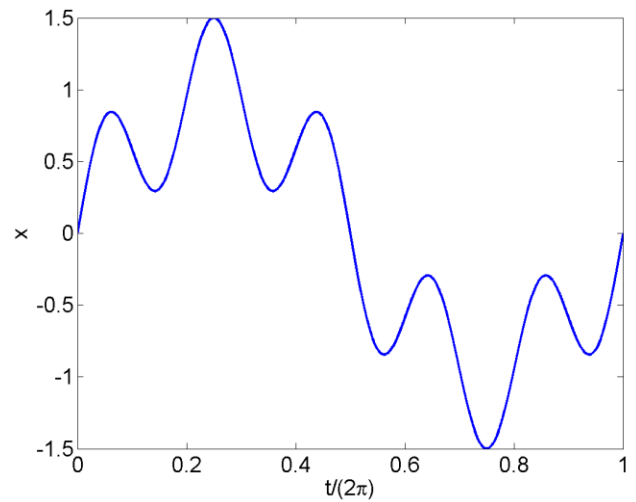
A)

B)

C)

D)

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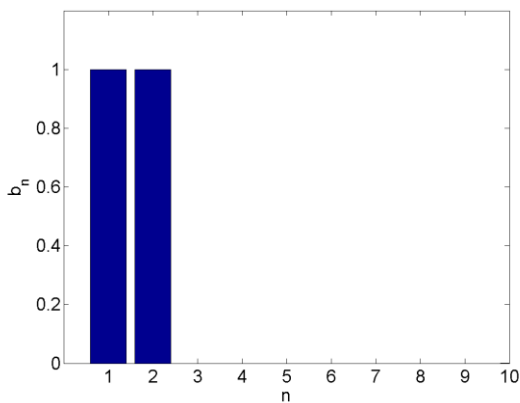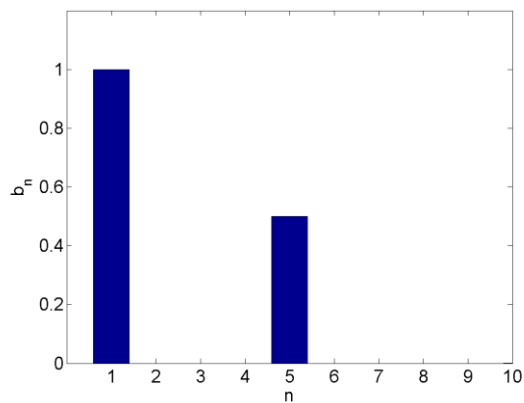
CT6-5. Match the plot on the right (a periodic function of time) to the correct plot below of the Fourier coefficients. In other words, $x(t)=b_1\sin(t)+b_2\sin(2t)+b_3\sin(3t)+\ldots$ Pick the plot below that shows the correct first few Fourier coefficients b_n.
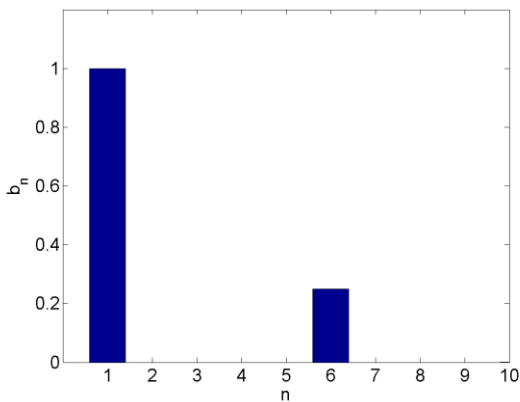
A)

B)

C)

D)

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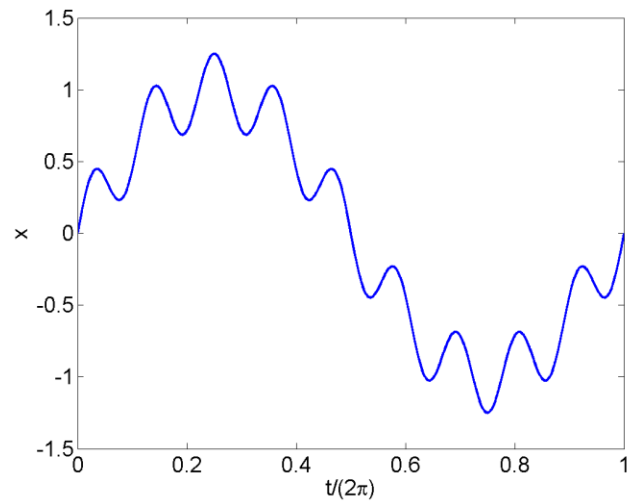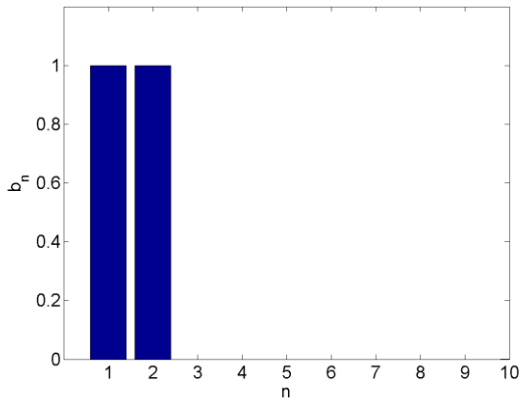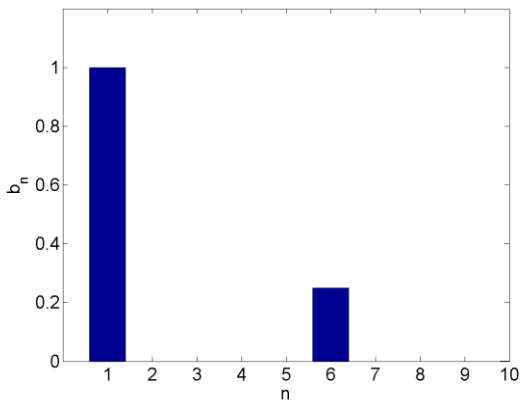
CT6-6. Match the plot on the right (a periodic function of time) to the correct plot below of the Fourier coefficients. In other words, $x(t)=b_1\sin(t)+b_2\sin(2t)+b_3\sin(3t)+\ldots$ Pick the plot below that shows the correct first few Fourier coefficients b_n.
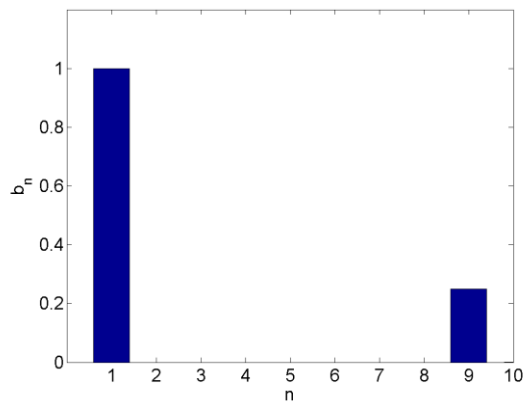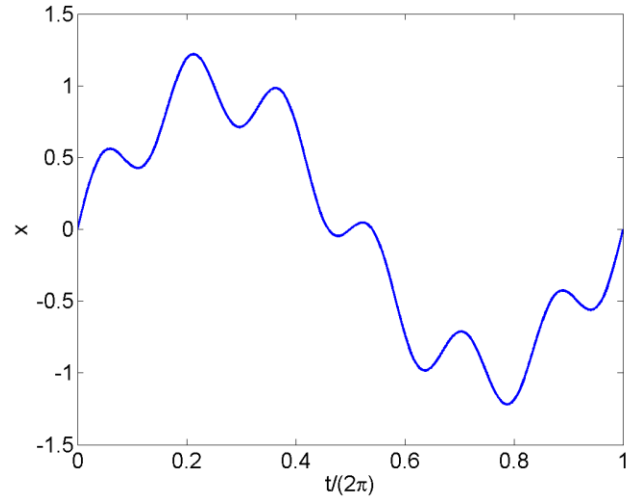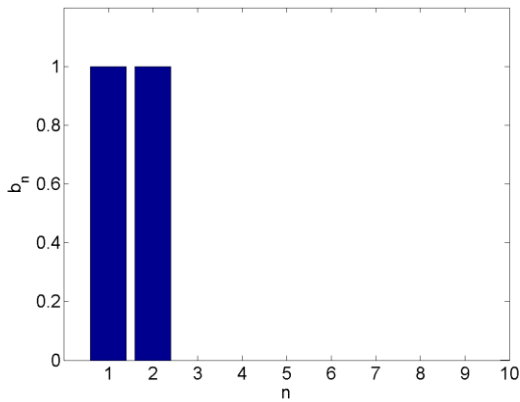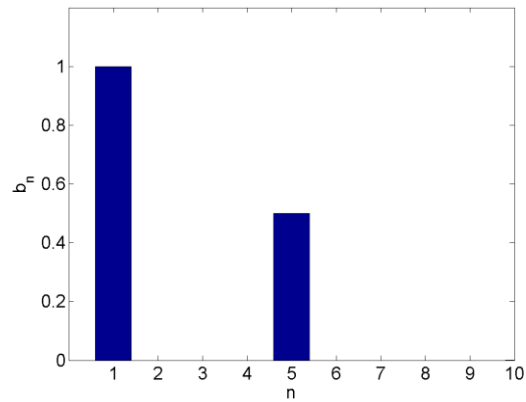

A)

B)

C)

D)

CT6-7. Match the plot on the right (a periodic function of time) to the correct plot below of the Fourier coefficients. In other words, $x(t)=b_1\sin(t)+b_2\sin(2t)+b_3\sin(3t)+\ldots$ Pick the plot below that shows the correct first few Fourier coefficients b_n.
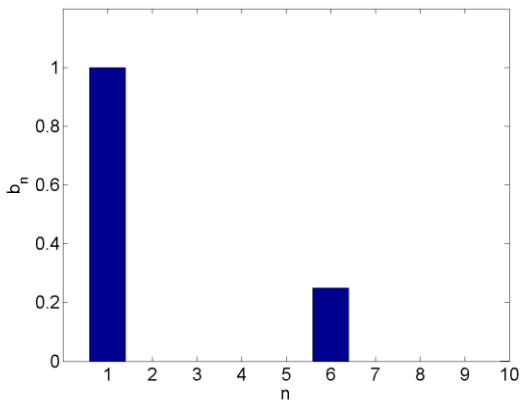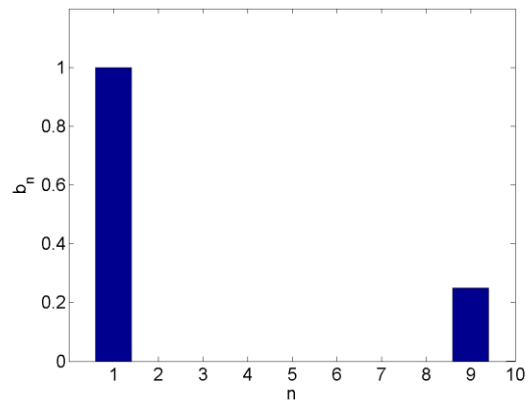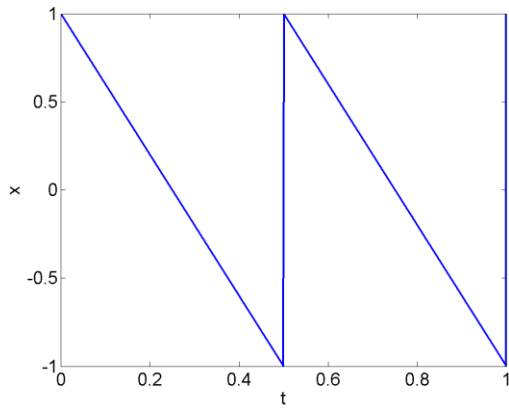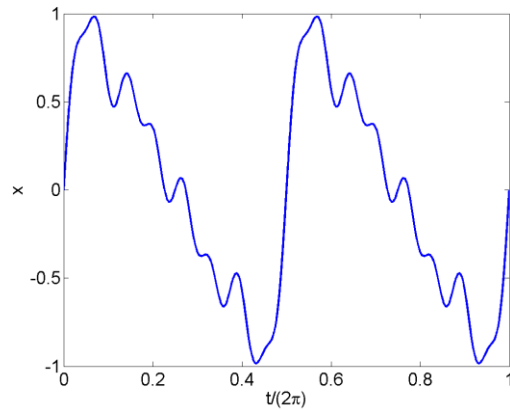

A)

B)

C)

D)

CT6-8. Which plot of a periodic function of time (1 or 2) is correctly represented by the shown Fourier series coefficients (a or b)?
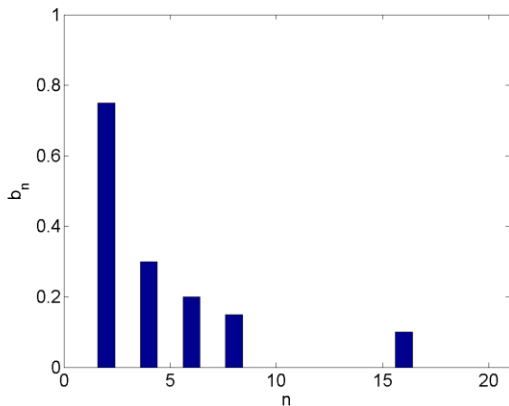
(1)

(2)
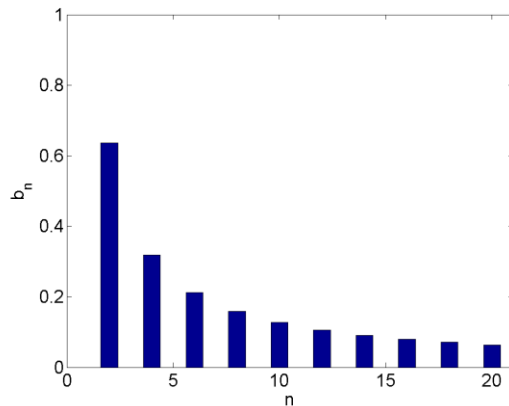
(a)

(b)

A) 1 is (a), 2 is (b)

B) 1 is (b), 2 is (a)

CT6-9. What is the approximate Q of the oscillator?

A) 10^{-6}
B) 10^{-2}
C) 1
D) 10^{2}
E) 10^{6}

CT6-10. Superposition (still under construction)

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