Suggested problems 34

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1. Determine whether the given function is even, odd, or neither.

   (a) $x^3 - 2x$;

   (b) $x^4 + x^2 + 6$;

   (c) e^{-x}.

2. Let $f(x) = 3 - x, \qquad 0 < x < 2.$

   (a) Consider the **odd** periodic extension, of period $T = 4$, of $f(x)$. Sketch 3 periods, on the interval $-6 < x < 6$, of this odd periodic extension.

   (b) Write the integrals which can be used to find the Fourier sine coefficients of the odd periodic extension in the previous item (a). What are the Fourier cosine coefficients of the odd periodic extension?

   (c) Consider the **even** periodic extension, of period $T = 4$, of $f(x)$. Sketch 3 periods, on the interval $-6 < x < 6$, of this even periodic extension.

   (d) Find the constant term of the Fourier series of the corresponding cosine series of the function described in the previous item (c). Write the integrals which can be used to find the Fourier cosine coefficients of the even periodic function in (c).

   (e) Determine the value that the Fourier series of each periodic extension, as described in parts (a) and (c), converges to at $x = 18$.