Bahadır Güray Özgödek
150150013

REPORT

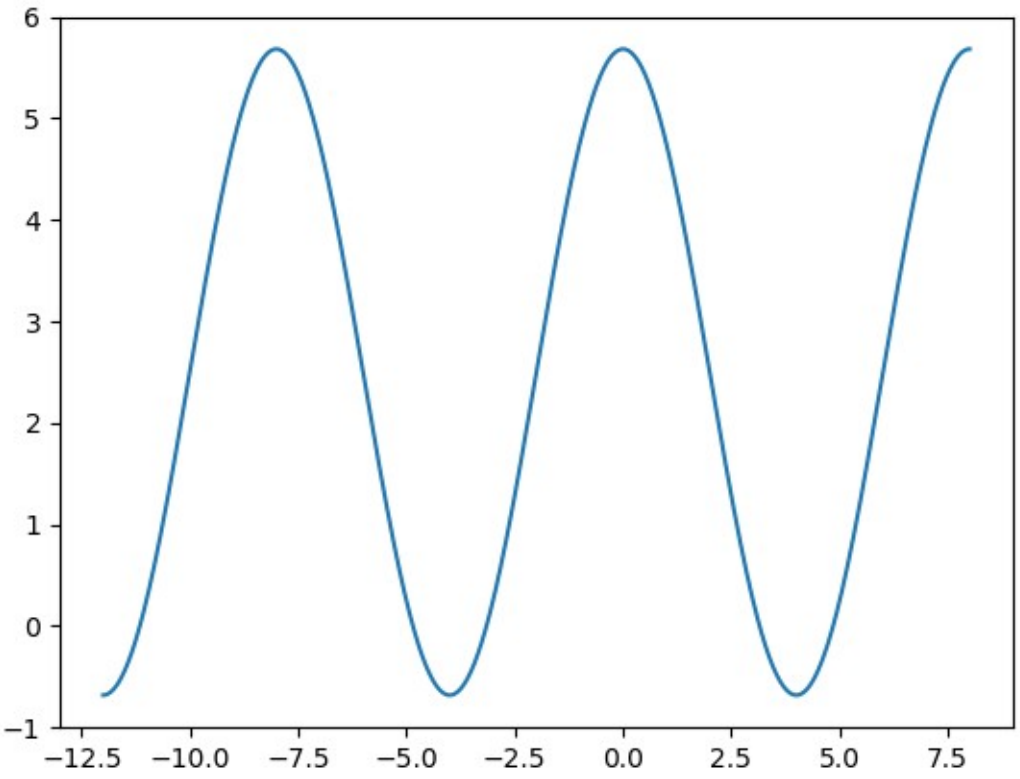
a)

To find the harmonics of square wave I used this formula:

$$x(t) = \frac{A}{2} + \frac{2A}{\Pi}(\sin w_0 t + \frac{1}{3}\sin(3w_0 t) + \frac{1}{5}\sin(5w_0 t) + ...)$$

Harmonics for x(1):

H1:



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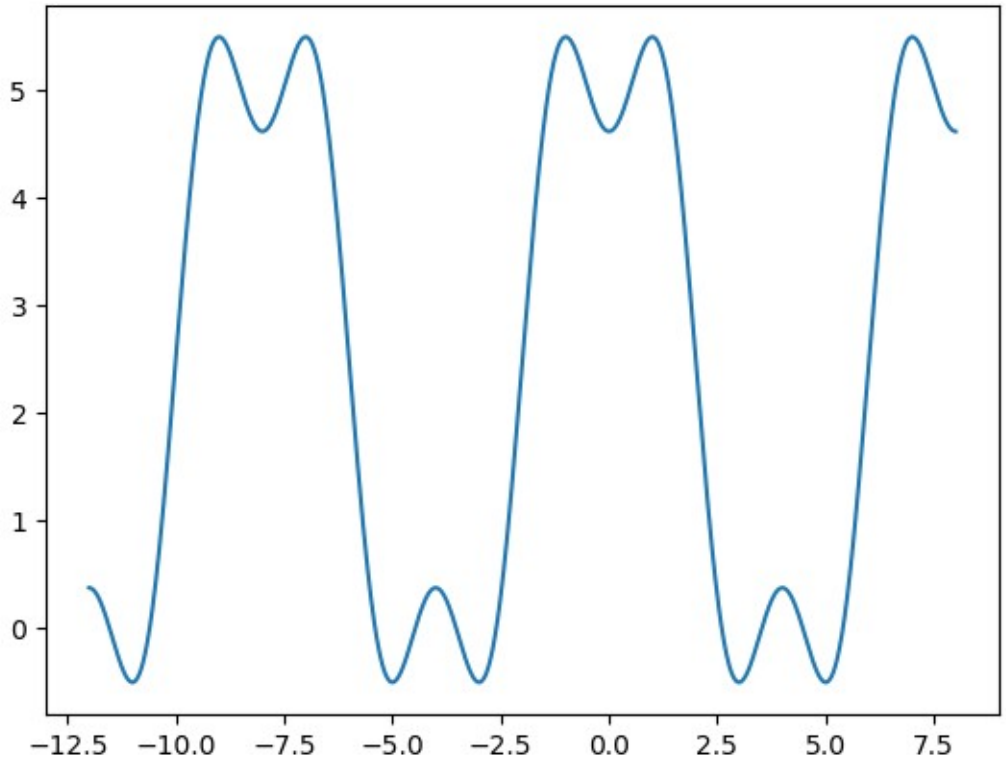
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4
3
2
1
0
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−10.0
−7.5
−5.0
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2.5
5.0
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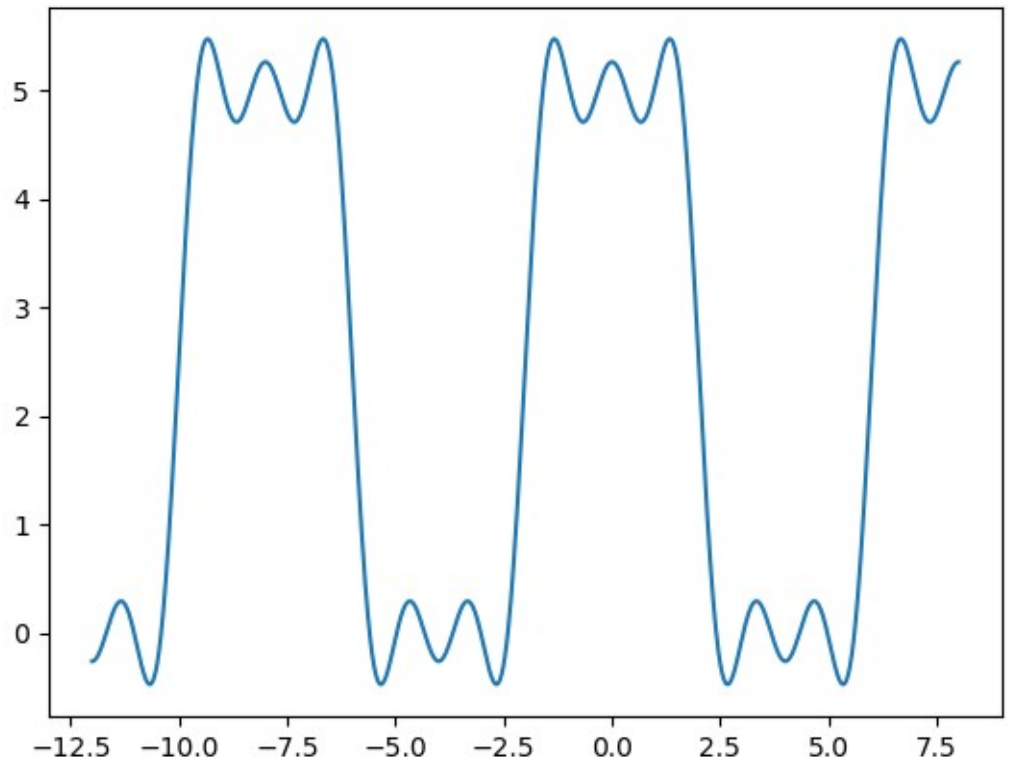
H3: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4
3
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2.5
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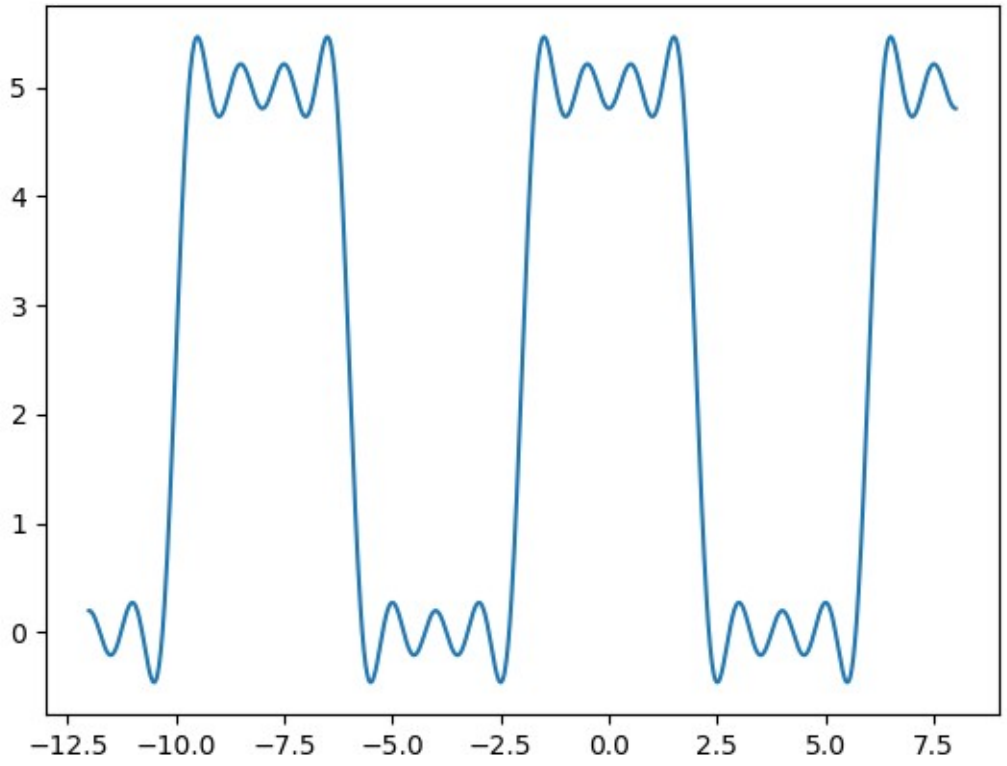
7.5

H4: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−7.5
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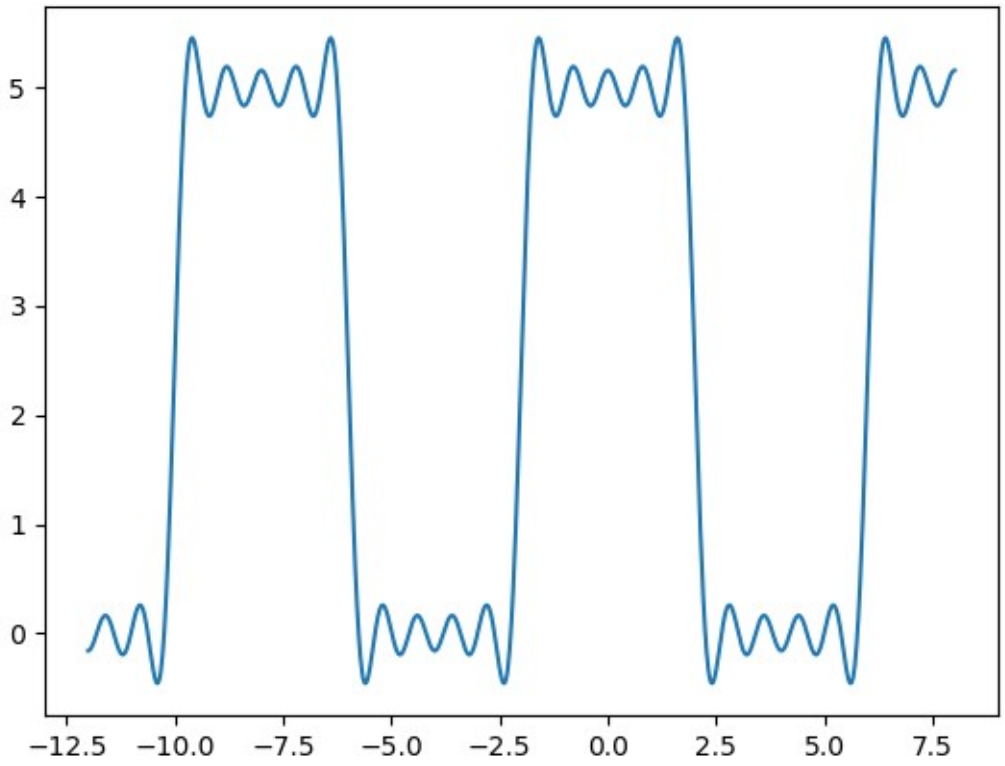
0.0
2.5
5.0
7.5

H5: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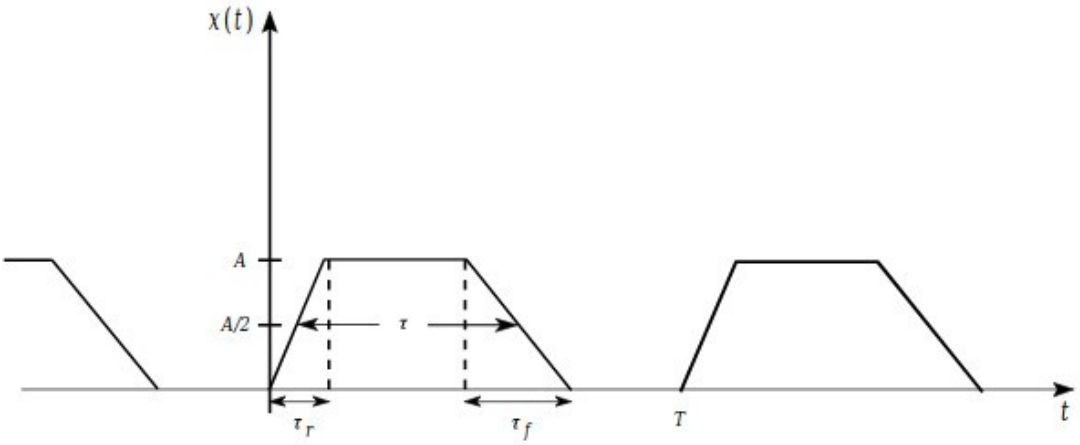
Trapezoidal Wave:



To find the harmonics of trapezoidal wave I used this formula:

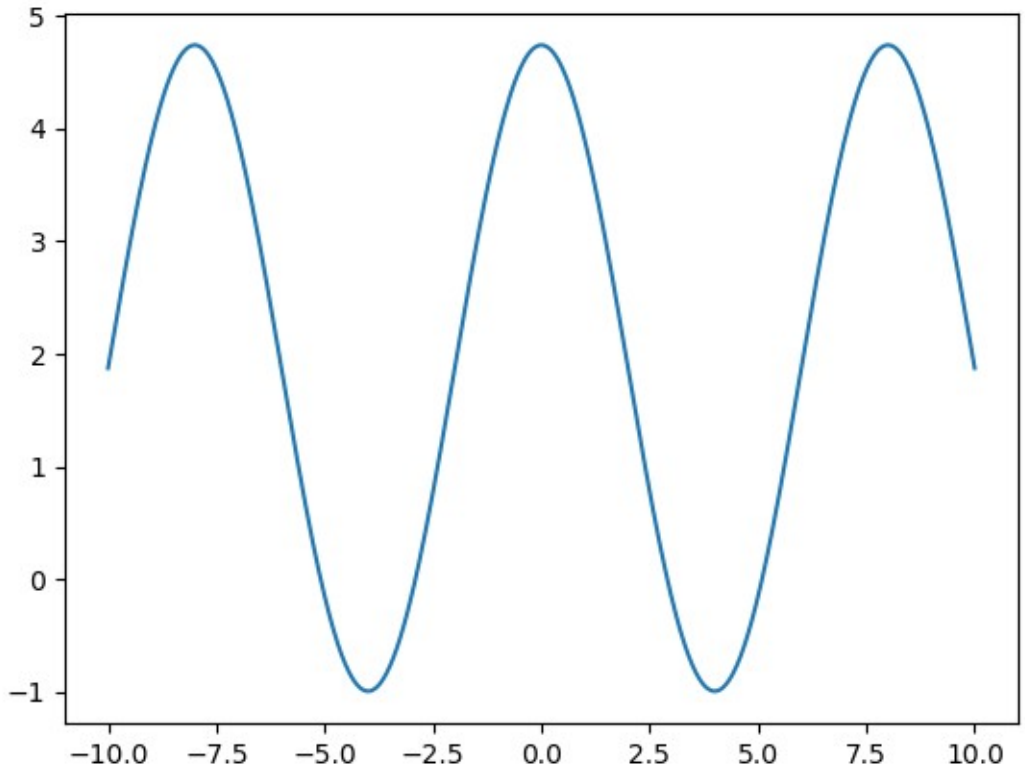
$$x(t) = C_0 + \sum_{n=1}^{\infty} \left| C_n \right| \cos(n\omega_0 t + \angle C_n)$$

To find the every C_n I used:

$$C_n = A\frac{\tau}{T}\,\frac{\sin(n\omega_0\tau/2)}{n\omega_0\tau/2}\,\frac{\sin(n\omega_0\tau_r/2)}{(n\omega_0\tau_r/2)}$$

Harmonics for x(1):

H1: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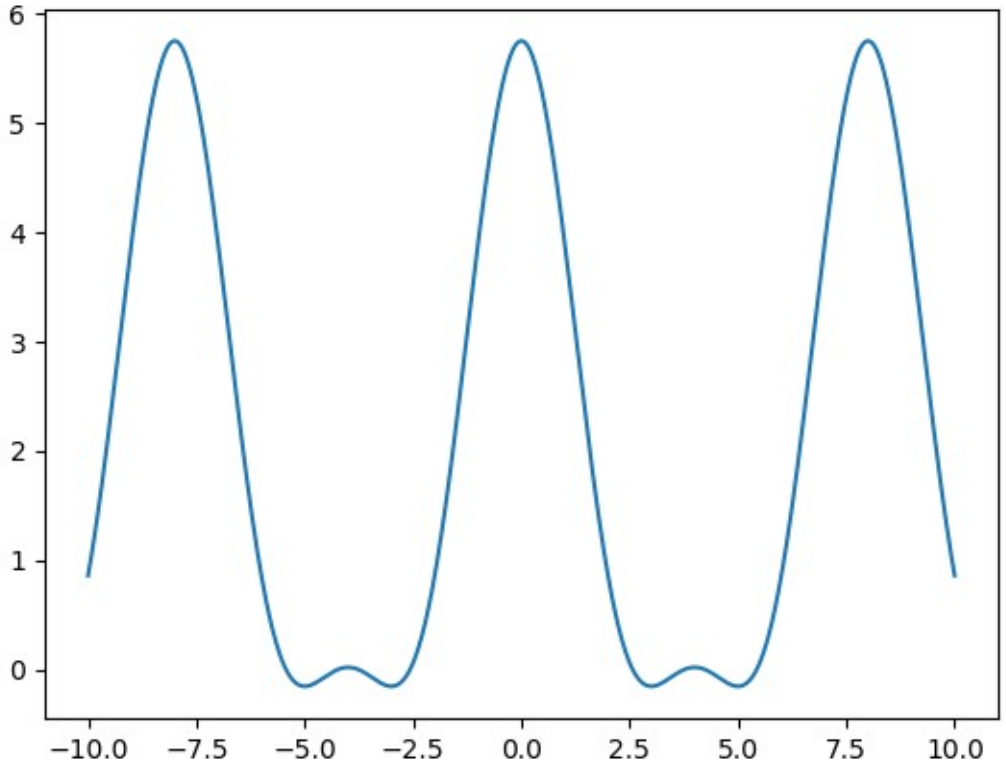
0.0
2.5
5.0
7.5
10.0

H2: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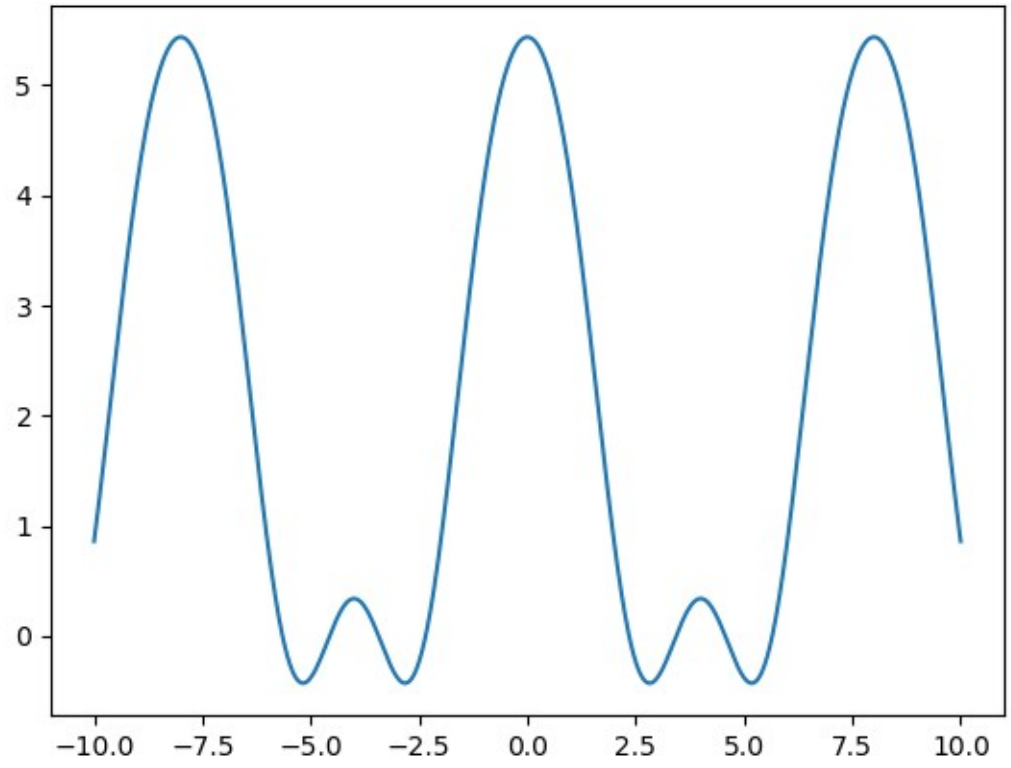
5.0
7.5
10.0

H3: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2.5
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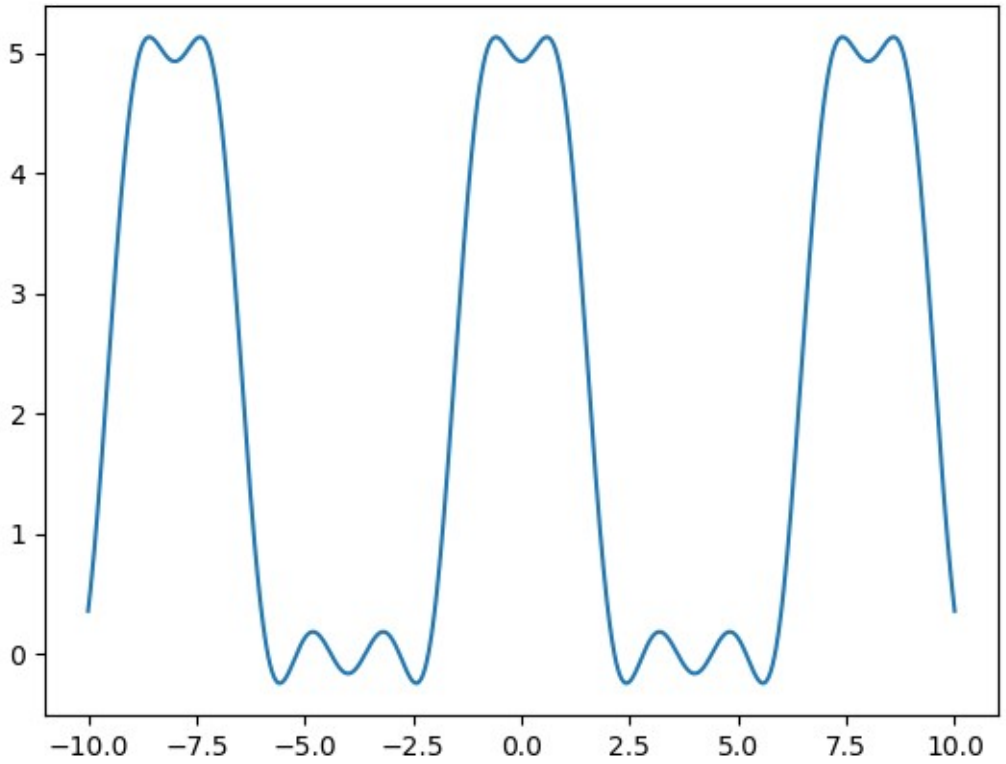
7.5
10.0

H4: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−7.5
−5.0
−2.5
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2.5
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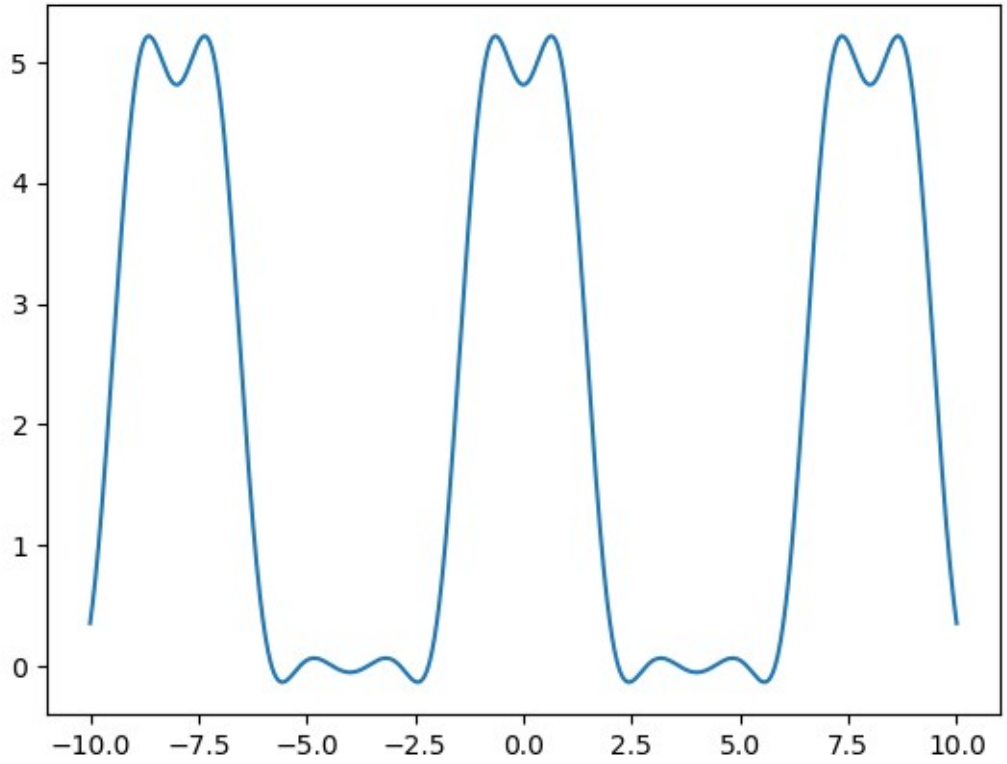
7.5
10.0

H5:



b)

I used this formula to calculate THD:

$$THD = \frac{\sqrt{\sum_{n=2}^{\infty} V_{n\_rms}^2}}{V_{fund\_rms}}$$

THD for x(1) = 2.286001624779924
THD for x(2) = 9.42867945424435