Unit 12 - Week 9-Examples of Fourier Transform, Sampling and Fourier Analysis of Discrete time Signals

Assignment-9

Due on: 2020-04-14, 23:00 IST

1. Consider a periodic signal with fundamental frequency \( f_0 \). The signal is sampled at a rate of \( f_s \), where \( f_s > 2f_0 \). Show that the frequency spectrum of the sampled signal is periodic with period \( 1/f_s \).

2. Consider a periodic signal with fundamental frequency \( f_0 \). The signal is sampled at a rate of \( f_s \), where \( f_s < f_0 \). Show that the frequency spectrum of the sampled signal is aliased.

3. Consider a periodic signal with fundamental frequency \( f_0 \). The signal is sampled at a rate of \( f_s \), where \( f_s = 2f_0 \). Show that the frequency spectrum of the sampled signal is periodic with period \( 1/2f_0 \).

4. Consider a periodic signal with fundamental frequency \( f_0 \). The signal is sampled at a rate of \( f_s \), where \( f_s = 2f_0/3 \). Show that the frequency spectrum of the sampled signal is aliased.

5. Consider a periodic signal with fundamental frequency \( f_0 \). The signal is sampled at a rate of \( f_s \), where \( f_s = 2f_0/4 \). Show that the frequency spectrum of the sampled signal is periodic with period \( 1/(2f_0/3) \).

6. Consider a periodic signal with fundamental frequency \( f_0 \). The signal is sampled at a rate of \( f_s \), where \( f_s = 2f_0/5 \). Show that the frequency spectrum of the sampled signal is aliased.

7. Consider a periodic signal with fundamental frequency \( f_0 \). The signal is sampled at a rate of \( f_s \), where \( f_s = 2f_0/6 \). Show that the frequency spectrum of the sampled signal is periodic with period \( 1/(2f_0/5) \).

8. Consider a periodic signal with fundamental frequency \( f_0 \). The signal is sampled at a rate of \( f_s \), where \( f_s = 2f_0/7 \). Show that the frequency spectrum of the sampled signal is aliased.

9. Consider a periodic signal with fundamental frequency \( f_0 \). The signal is sampled at a rate of \( f_s \), where \( f_s = 2f_0/8 \). Show that the frequency spectrum of the sampled signal is periodic with period \( 1/(2f_0/7) \).

10. Consider a periodic signal with fundamental frequency \( f_0 \). The signal is sampled at a rate of \( f_s \), where \( f_s = 2f_0/9 \). Show that the frequency spectrum of the sampled signal is aliased.

11. Consider a periodic signal with fundamental frequency \( f_0 \). The signal is sampled at a rate of \( f_s \), where \( f_s = 2f_0/10 \). Show that the frequency spectrum of the sampled signal is periodic with period \( 1/(2f_0/9) \).

12. Consider a periodic signal with fundamental frequency \( f_0 \). The signal is sampled at a rate of \( f_s \), where \( f_s = 2f_0/11 \). Show that the frequency spectrum of the sampled signal is aliased.

13. Consider a periodic signal with fundamental frequency \( f_0 \). The signal is sampled at a rate of \( f_s \), where \( f_s = 2f_0/12 \). Show that the frequency spectrum of the sampled signal is periodic with period \( 1/(2f_0/11) \).

14. Consider a periodic signal with fundamental frequency \( f_0 \). The signal is sampled at a rate of \( f_s \), where \( f_s = 2f_0/13 \). Show that the frequency spectrum of the sampled signal is aliased.

15. Consider a periodic signal with fundamental frequency \( f_0 \). The signal is sampled at a rate of \( f_s \), where \( f_s = 2f_0/14 \). Show that the frequency spectrum of the sampled signal is periodic with period \( 1/(2f_0/13) \).

16. Consider a periodic signal with fundamental frequency \( f_0 \). The signal is sampled at a rate of \( f_s \), where \( f_s = 2f_0/15 \). Show that the frequency spectrum of the sampled signal is aliased.

17. Consider a periodic signal with fundamental frequency \( f_0 \). The signal is sampled at a rate of \( f_s \), where \( f_s = 2f_0/16 \). Show that the frequency spectrum of the sampled signal is periodic with period \( 1/(2f_0/15) \).

18. Consider a periodic signal with fundamental frequency \( f_0 \). The signal is sampled at a rate of \( f_s \), where \( f_s = 2f_0/17 \). Show that the frequency spectrum of the sampled signal is aliased.

19. Consider a periodic signal with fundamental frequency \( f_0 \). The signal is sampled at a rate of \( f_s \), where \( f_s = 2f_0/18 \). Show that the frequency spectrum of the sampled signal is periodic with period \( 1/(2f_0/17) \).

20. Consider a periodic signal with fundamental frequency \( f_0 \). The signal is sampled at a rate of \( f_s \), where \( f_s = 2f_0/19 \). Show that the frequency spectrum of the sampled signal is aliased.