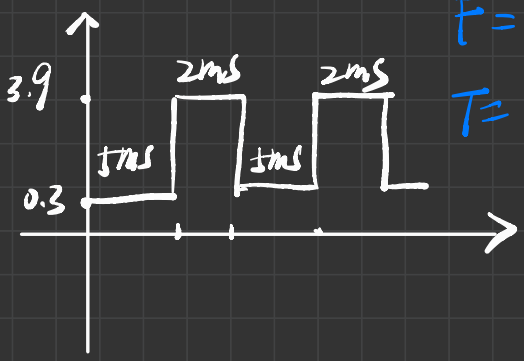
1-8



1-9

$F = \frac{1}{7}$ Hz

$T = 7$ ms

duty circle $= \frac{1}{7}$

1-10

① periodic $F = \frac{1}{4} = 250$ kHz

$T = 4\ \mu s$

duty $= \frac{1}{4}$ kHz

② periodic $T = 9\ \mu s$

$F = \frac{1}{9}$ kHz

duty $= \frac{4}{9}$ kHz

③ periodic $T = 6\ \mu s$

$F = \frac{1}{6}$ kHz

duty $= \frac{2.5}{6}$ kHz

④ periodic $T = 6\ \mu s$

$F = \frac{1}{6}$ kHz

duty $= \frac{3.3}{6}$ kHz

1-11 Analog: (b) (c) (d)

Digital: (a) (e)

1-12. Analog: (c) (e)

Digital: (a) (b) (d)

1-13.

(a) $= 2^4 + 2^3 + 2^0 = 16 + 8 + 1 = 25_{10}$

(b) $= 2^3 + 2^0 + 2^{-1} + 2^{-4}$

$= 8 + 1 + 0.5 + 0.0625$

$= 9.5625_{10}$

(c) $= 2^{10} + 2^7 + 2^6 + 2^4 + 2^3 + 2^0 + 2^{-1} + 2^{-3} + 2^{-4}$

$= 1024 + 128 + 64 + 16 + 8 + 1 + 0.5 + 0.125 + 0.0625$

$= 1241.6875_{10}$

1-14 (a) $= 2^4 + 2^1 + 2^0 = 16 + 2 + 1 = 19_{10}$

(b) $= 2^3 + 2^2 + 2^{-2} + 2^{-4} = 8 + 4 + 0.25 + 0.0625$

$= 12.3125_{10}$

(c) $= 2^{10} + 2^9 + 2^6 + 2^5 + 2^2 + 2^{-1} + 2^{-4}$

$= 1024 + 128 + 64 + 32 + 4 + 0.5 + 0.0625$

$= 1252.5625_{10}$

1-17. $2^{10}-1=(1023)_{10}$

1-18 $2^{14}-1=2^{10}\cdot 2^4-1=1024\cdot 16-1=(16383)_{10}$

1-19. $511<2^9=512$. It needs 9 bits.

1-20 $63<64=2^6$ It needs 6 bits

1-21 increasing: (b) (c)

decreasing: (a)

1-22. (a) $15<16=2^4$ It needs 3 lines.

(b) Just 1 line.