Ch 471 Homework
Ch 2 Skoog

2-1 (a) Remember that the voltage across each resistor is equal to the ratio of the resistor to the sum of the resistors, times the reference voltage. For example –

$$V_1 = 10.0V \times \frac{R_1}{R_1+R_2+R_3} \quad \text{and so on.}$$

In addition, the sum of the voltages across each resistor must equal 10 V. Therefore it follows that –

$$V_3 = 10.0V - 1.0V - 4.0V = 5.0V$$

Now we can solve the problem. Let's pick 50 Ω for R_1. It immediately follows that R_2 must be 4X this value or 200 Ω because the voltage across R_2 is 4X as much! Now solve for R_3 –

$$5.0V = 10.0V \times \frac{R_3}{R_1+R_2+R_3} \quad \text{or}$$

$$0.50 = \frac{R_3}{50+200+R_3} \Rightarrow R_3 = 250\,\Omega$$

Use a combination of a 200 + 50 Ω resistor in series and you're done!

(b) 5.0 V as explained above

2-16 (a) $RC = (50\times10^3\,\Omega)(0.035\times10^{-6}F) = 1.75\times10^{-3}s = 1.75\,ms$

Ch 471 Homework

Ch 3 Skoog

3-1. (a) inverting amplifier

(d) integrator

(e) differentiator

3-11. Op amp #1 is configured as an integrator, and #2 is a differentiator. So the output will be the same as the input!

Ch 471 Homework
Ch 4 Skoog

1. (a) $24 = 16 + 8$ binary = 11000
$2^4 + 2^3$

(b) $79 = 64 + 8 + 4 + 2 + 1$ binary = 1001111
$2^6 + 2^3 + 2^2 + 2^1 + 2^0$

(c) $136 = 128 + 8$ binary = 10001000
$2^7 + 2^3$

(d) $581 = 512 + 64 + 4 + 1$ binary = 1001000101
$2^9 + 2^6 + 2^2 + 2^0$

2. (a) $101 = 2^2 + 2^0 = 4 + 1 = 5$
(b) $10101 = 2^4 + 2^2 + 2^0 = 16 + 4 + 1 = 21$
(c) $11100010 = 2^7 + 2^6 + 2^5 + 2^1 = 128 + 64 + 32 + 2 = 226$
(d) $1101001001 = 2^9 + 2^8 + 2^6 + 2^3 + 2^0 = 512 + 256 + 64 + 8 + 1 = 841$

3. (a) 8-bits $= \frac{1}{255} \times 10\,V = 3.9 \times 10^{-3}\,V = 3.9\,mV$

(b) 12-bits $= \frac{1}{4095} \times 10V = 2.4 \times 10^{-3} V = 2.4\,mV$

(c) 16-bits $= \frac{1}{65535} \times 10V = 1.5 \times 10^{-4} V = 0.15\,mV$

divided by $2^n - 1$ where $n = \#$ bits

e.g. 8-bit $11111111 = 2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0$
$= 255$