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:

\[ V_1 = 10.0\,V \times \frac{R_1}{R_1 + R_2 + R_3} \]

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

\[ V_3 = 10.0\,V - 1.0\,V - 4.0\,V = 5.0\,V \]

Now we can solve the problem. Let's pick 50\,\Omega for \( R_1 \). It immediately follows that \( R_2 \) must be 4 times this value or 200\,\Omega because the voltage across \( R_2 \) is 4 times as much! Now solve for \( R_3 \):

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

\[ 0.50 = \frac{R_3}{50 + 200 + R_3} \quad \Rightarrow \quad R_3 = 250\,\Omega \]

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

(b) 5.0\,V as explained above

2-16 (a) \[ R_C = (50 \times 10^3 \,\Omega)(0.035 \times 10^{-6} \,F) = 1.75 \times 10^{-3} = 1.75 \,ms \]
3-1. (a) inverting amplifier
   (d) integrator
   (e) differentiator

11. Op amp #1 is configured as an integrator, and #2 is a differentiator. So the output will be the same as the input!
1. (a) \( 24 = 16 + 8 \)
   \[ \frac{2^4}{2^4} + \frac{2^3}{2^3} \]
   binary = 11000

   (b) \( 79 = 64 + 8 + 4 + 2 + 1 \)
   \[ \frac{2^6}{2^6} + \frac{2^3}{2^3} + \frac{2^2}{2^2} + \frac{2^1}{2^1} + \frac{2^0}{2^0} \]
   binary = 1001111

   (c) \( 136 = 128 + 8 \)
   \[ \frac{2^7}{2^7} + \frac{2^3}{2^3} \]
   binary = 10001000

   (d) \( 581 = 512 + 64 + 4 + 1 \)
   \[ \frac{2^9}{2^9} + \frac{2^6}{2^6} + \frac{2^2}{2^2} + \frac{2^0}{2^0} \]
   binary = 1001000101

2. (a) \( 101 = 2^2 + 2^0 = 4 + 1 = 5 \)

   (b) \( 10101 = 2^4 + 2^2 + 2^0 = 16 + 4 + 1 = 21 \)

   (c) \( 11100100 = 2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^0 = 128 + 64 + 32 + 16 + 8 + 4 + 1 = 226 \)

   (d) \( 1101001001 = 2^9 + 2^8 + 2^6 + 2^5 + 2^3 + 2^2 + 2^0 = 512 + 256 + 64 + 32 + 8 + 4 + 1 = 841 \)

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

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

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

   divided by \( 2^n - 1 \) where \( n = \#\text{ bits} \)

   e.g. 8-bit \( 11111111 = \frac{2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0}{2^8 - 1} = 255 \)