1. Fill in the chart (without looking at your notes!):

<table>
<thead>
<tr>
<th>Domain</th>
<th>( y = 2^x )</th>
<th>( y = \log_2 x )</th>
<th>graphs</th>
</tr>
</thead>
<tbody>
<tr>
<td>((-\infty, \infty))</td>
<td>((0, \infty))</td>
<td>((-\infty, \infty))</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>((0, \infty))</td>
<td>((-\infty, \infty))</td>
<td></td>
</tr>
<tr>
<td>Equation of asymptote</td>
<td>(y = 0)</td>
<td>(x = 0)</td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>((0, 1))</td>
<td>((1, 0))</td>
<td></td>
</tr>
</tbody>
</table>

2. Solve the following without using a calculator:
   a. \(2^{x+7} = 16^{x-3}\)
      \[2^{x+7} = (2^4)^{x-3}\]
      \[x + 7 = 4(x - 3)\]
      \[7 = 4x - 12\]
      \[19 = 3x\]
      \[\frac{19}{3} = x\]
   b. \(27^{x+4} = \frac{1}{9}\)
      \[3^{3(x+4)} = 3^{-2}\]
      \[3(x+4) = -2\]
      \[3x + 12 = -2\]
      \[3x = -14\]
      \[x = -\frac{14}{3}\]
   c. \(\ln e^{-2x+9} = 15\)
      \[\ln e^x = x\]
      \[-2x + 9 = 15\]
      \[-2x = 6\]
      \[x = -3\]
   d. \(\log_2(-8x - 15) = 2\)
      \[2^x = -8x - 15\]
      \[x^2 + 8x + 15 = 0\]
      \[(x + 3)(x + 5) = 0\]
      \[x = -3, x = -5\]
      \[\text{no solutions}\]
      \[b > 0, b \neq 1\]

3. A radioisotope is used as a power source for a satellite. The power output is given by the equation
   \[P = 50e^{\frac{t}{250}},\]
   where \(P\) is the power in watts and \(t\) is the time in days.

   a. Find the power available after 100 days.
      \[P = 50e^{\frac{-100}{250}}\]
      \[P \approx 33.516\]
      The power is approx 33.5 watts after 100 days.

   b. Ten watts of power are required to operate the equipment in the satellite. How long can the satellite continue to operate?
      \[0.2 = \frac{10}{50} = e^{\frac{-t}{250}}\]
      \[\ln 0.2 = \ln e^{\frac{-t}{250}}\]
      \[(\ln 0.2) = \frac{-t}{250}\]
      \[-250 \ln 0.2 = t\]
      \[t \approx 402.3598\]
      Approx 402 days
4. Solve each of the following equations to the nearest thousandth:

   a. \[ 3e^{5x} + 4 = 28 \]
      \[ x = \frac{\ln 8}{5} \]
      \[ x \approx 0.4159 \]

   b. \[ \ln x = 4.2506 \]
      \[ e^{4.2506} = x \]
      \[ x \approx 70.1475 \]

   c. \[ 5^{2x+1} = 50 \]
      \[ \log_5 50 = 2x + 1 \]
      \[ \log_5 50 - 1 = x \]
      \[ 0.7153 \approx x \]

   d. \[ \log_3 x - \log_3 (x-4) = 2 \]
      \[ \log_3 \frac{x}{x-4} = 2 \]
      \[ 3^2 = \frac{x}{x-4} \]
      \[ 9 = \frac{x}{x-4} \]
      \[ x = 36 \]

5. Use the formula \( A = Pe^r \) for each of the following:

   a. How long should you invest $2,500 at 6.5% so that its value triples?
      \[ \frac{7500}{2500} = e^{0.065t} \]
      \[ 3 = e^{0.065t} \]
      \[ \ln 3 = 0.065t \]
      \[ t \approx 16.9017 \]
      \[ \text{Approx 17 years} \]

   b. In 5 years, I want to buy a car for $30,000. How much do I need to invest at 12% interest?
      \[ 30,000 = Pe^{0.12 \times 5} \]
      \[ 30000 = P \cdot e^{0.6} \]
      \[ P \approx 16,464.35 \]
      \[ \text{you would need to invest 16,464.35} \]

   c. A new house cost $280,000 when it was bought 10 years ago. It is now worth $360,000. Assuming a steady rate of growth, what was the yearly rate of appreciation?
      \[ 360,000 = 280,000 e^{10r} \]
      \[ \frac{360,000}{280,000} = e^{10r} \]
      \[ \ln \frac{9}{7} = 10r \]
      \[ r = \frac{\ln \left( \frac{9}{7} \right)}{10} \]
      \[ r \approx 0.02513 \]
      \[ \text{rate: 2.5%} \]