Ergebnisse Kapitel 14

1
\[ y = \left(\frac{1}{2}\right)^x \quad y = 4^x \quad y = \left(\frac{1}{3}\right)^x \quad y = 3^x \quad y = \left(\frac{1}{2}\right)^x \quad y = 2^x \]

2
a) \( a > 1 \)  
b) \( \text{alle } a \in \mathbb{R}^+ \setminus \{1\} \)  
c) \( a = 3 \)  
d) unmöglich

e) \( a < 1 \)

3
a) 9  
b) \( \sqrt{3} \)  
c) \( 2^{-1.3} = 0.2872 \)  
d) \( \pi^{-0.5} = 0.5642 \)

4
a)  
b)  
c)  
d)  

5
a) b) Spiegelung an der y-Achse  
c) Punktspiegelung am Nullpunkt
6 a) Streckung an der x-Achse mit Faktor 2, Translation in negativer x-Richtung um 1 Einheit
b) Streckung an der y-Achse mit Faktor \( \frac{1}{2} \)
c) Translation in positiver x-Richtung um 3 Einheiten, Streckung an der x-Achse mit Faktor \( \frac{1}{8} \)

7 a) Streckung an der x-Achse mit Faktor \( -\frac{1}{3} \)
b) Translation in positiver y-Richtung um 1.5 Einheiten
c) Translation in negativer x-Richtung um 1 Einheit, Streckung an der x-Achse mit Faktor \( \frac{1}{2} \)

8 a) \( h : y = 3^{x+2} \) b) \( h : y = 0.1 \cdot 3^x \) c) \( h : y = -3^{-x} \)

9 a) \( h : y = 4^{-x+1} - 2 \) b) \( h : y = 2^{-x} \) c) \( h : y = -4^{-x} + 2 \)

11 a) \( \left( 1 + \frac{1}{12} \right)^{12} = 2.61308 \), \( \left( 1 + \frac{1}{360} \right)^{360} = 2.71451 \), \( \left( 1 + \frac{1}{24 \cdot 360} \right)^{24 \cdot 360} = 2.71812 \)
b) \( e = 2.718281828459 \ldots \)
Ergebnisse Kapitel 14

12 a) \( b = \left(1 + \frac{1}{n}\right)^n \)
   b) 2, 2.25, 2.488, 2.5937, 2.70481, 2.718146, 2.7182806, 2.71828183
   c) \( e \)

13 a) \( \frac{8}{3} = 2.\overline{6} \)
   b) \( \frac{1957}{720} = 2.71805 \)
   c) \( \frac{9864101}{3628800} = 2.71828183 \)

14 a) 2.5937458 \( \approx \)
   b) 2.71692393 \( \approx \)
   c) 2.71828047

15

16 27 Tage
17 50 Tage

18 a) \( f(t) \)

<table>
<thead>
<tr>
<th>( t )</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(t) )</td>
<td>8</td>
<td>2</td>
<td>3</td>
<td>27</td>
<td>243</td>
<td>2187</td>
</tr>
<tr>
<td>( \frac{1}{27} )</td>
<td>( \frac{1}{3} )</td>
<td>2</td>
<td>8</td>
<td>32</td>
<td>128</td>
<td></td>
</tr>
</tbody>
</table>

b) \( r = \frac{81}{16} \)

c) \( f(t) \)

<table>
<thead>
<tr>
<th>( t )</th>
<th>0</th>
<th>0.5</th>
<th>1</th>
<th>1.5</th>
<th>2</th>
<th>2.5</th>
<th>3</th>
<th>3.5</th>
<th>4</th>
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<td>8</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>9</td>
<td>27</td>
<td>81</td>
<td>243</td>
<td></td>
</tr>
<tr>
<td>( \frac{1}{27} )</td>
<td>( \frac{1}{3} )</td>
<td>( \frac{1}{9} )</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>8</td>
<td>16</td>
<td>32</td>
</tr>
</tbody>
</table>

19 a) 2, 4, 8, 64, 512
   b) \( f(t) \)

<table>
<thead>
<tr>
<th>( t )</th>
<th>-8</th>
<th>1</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>13</th>
<th>19</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(t) )</td>
<td>( \frac{3}{8192} )</td>
<td>( \frac{3}{32} )</td>
<td>( \frac{3}{16} )</td>
<td>3</td>
<td>6</td>
<td>12</td>
<td>24</td>
<td>48</td>
<td>96</td>
<td>768</td>
<td>49152</td>
</tr>
</tbody>
</table>

20 a) \( \frac{2}{3}, \frac{4}{9}, \frac{8}{27}, \frac{16}{81} \)
   b) \( f(t) \)

<table>
<thead>
<tr>
<th>( t )</th>
<th>0</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(t) )</td>
<td>( \frac{243}{64} )</td>
<td>9</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>( \frac{1}{2} )</td>
<td>( \frac{1}{4} )</td>
<td>2</td>
<td>3</td>
<td>243</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

21 a) 81
   b) 729
   c) 3
   d) \( \sqrt[3]{3} \)
22  a) \( \frac{5}{3} \)  
   b) \( \frac{5}{6} \)

23  a) \( a = 2, \ b = 3 \)  
   b) \( a = 4.9190, \ b = 0.49593 \)  
   c) \( a = 0.10838, \ b = 2.2361 \)

24  a) 4581  
   b) 9125  
   c) 18175  
   d) 101760

25  a) 61 044 m³  
   b) 91 756 m³

26  a) \( 6.39 \cdot 10^{19} \)  
   b) \( 7.97 \cdot 10^{18} \)  
   c) \( 1.24 \cdot 10^{17} \)  
   d) \( 3.01 \cdot 10^{13} \)

27  a) 11.4 cm  
   b) 0.2 cm

28  a) \( f(t) = 5000 \cdot (\sqrt[3]{3})^t = 5000 \cdot 3^{\frac{t}{3}} \)  
   b) \( f(t) = 1000 \cdot \sqrt[3]{3} \cdot \left(\frac{100}{\sqrt[3]{3}}\right)^t = 1000 \cdot 3^{\frac{t}{3}} \cdot 3^{-\frac{t}{300}} \)

29  a) \( 200 000 \cdot \sqrt{5} \cdot (\sqrt[4]{5})^t = 200 000 \cdot 5^{\frac{t}{4}} \cdot 5^{\frac{t}{60}} \)  
   b) \( f(t) = 1200 \cdot \left(\sqrt[3]{2}\right)^t = 1200 \cdot 2^{-\frac{t}{60}} \)

30  a) 1.1, 1.5, \( \frac{4}{3} \)  
   b) 0.95, 0.8, \( \frac{5}{6} \)

31  a) Zunahme 20 %  
   b) Abnahme 50 %  
   c) Abnahme 2 %  
   d) Zunahme 16\( \frac{2}{3} \) %  
   e) Zunahme 200 %  
   f) Abnahme 11\( \frac{1}{5} \) %

32  a) 3.526 %  
   b) 3.730 %

33  a) b) 29.29 %

34  a) 93.22 Fr.  
   b) 99.89 Fr.  
   c) 104.35 Fr.

35  7.784 %

36  5.80 %

37  22.27 %

38  a) 25 °C  
   b) 9 °C  
   c) 23.77 °C

39  a) 21 °C  
   b) 75 °C  
   c) 29.28 °C

40  a) \( a = 1, \ b = 0.1 \)  
   b) \( a = 1, \ b = \sqrt[3]{2} = 1.072 \)  
   c) \( a = 2.1, \ b = \sqrt[11]{1} = 1.271 \)