10. Each of the graphs approaches \( \infty \) as \( x \to -\infty \), and each approaches 0 as \( x \to \infty \). The smaller the base, the faster the function grows as \( x \to -\infty \), and the faster it approaches 0 as \( x \to \infty \).

![Graph](image)

18. (a) This reflection consists of first reflecting the graph about the \( x \)-axis (giving the graph with equation \( y = -e^x \)) and then shifting this graph 2 \cdot 4 = 8 units upward. So the equation is \( y = -e^x + 8 \).

(b) This reflection consists of first reflecting the graph about the \( y \)-axis (giving the graph with equation \( y = e^{-x} \)) and then shifting this graph 2 \cdot 2 = 4 units to the right. So the equation is \( y = e^{-(x-4)} \).

10. The graph of \( f(x) = 10 - 3x \) is a line with slope \(-3\). It passes the Horizontal Line Test, so \( f \) is one-to-one.

**Algebraic solution:** If \( x_1 \neq x_2 \), then \(-3x_1 \neq -3x_2 \) \( \Rightarrow \) 10 - 3x_1 \neq 10 - 3x_2 \( \Rightarrow \) \( f(x_1) \neq f(x_2) \), so \( f \) is one-to-one.

18. (a) \( f \) is 1-1 because it passes the Horizontal Line Test.

(b) Domain of \( f = [-3, 3] \) = Range of \( f^{-1} \). Range of \( f = [-1, 3] \) = Domain of \( f^{-1} \).

(c) Since \( f(0) = 2 \), \( f^{-1}(2) = 0 \).

(d) Since \( f(-1.7) \approx 0 \), \( f^{-1}(0) = -1.7 \).

28. \( y = f(x) = 2 - e^x \Rightarrow e^x = 2 - y \Rightarrow x = \ln(2 - y) \). Interchange \( x \) and \( y \): \( y = \ln(2 - x) \). So \( f^{-1}(x) = \ln(2 - x) \). From the graph, we see that \( f \) and \( f^{-1} \) are reflections about the line \( y = x \).

![Graph](image)

38. (a) \( e^{-2 \ln x} = (e^{\ln x})^{-2} \equiv 5^{-2} = \frac{1}{25} \)

(b) \( \ln(e^{2e}) = \ln(e^{10}) = 10 \)

56. (a) \( 1 < e^{2x-1} < 2 \Rightarrow \ln 1 < 3x - 1 < \ln 2 \Rightarrow 0 < 3x - 1 < \ln 2 \Rightarrow 1 < 3x < 1 + \ln 2 \Rightarrow \frac{1}{3} < x < \frac{1}{3}(1 + \ln 2) \)

(b) \( 1 - 2 \ln x < 3 \Rightarrow -2 \ln x < 2 \Rightarrow \ln x > -1 \Rightarrow x > e^{-1} \)
2. (a) Slope \(= \frac{2258 - 2320}{49 - 38} = \frac{418}{11} \approx 69.67 \)
(b) Slope \(= \frac{2248 - 2661}{49 - 42} = \frac{287}{7} = 71.75 \)
(c) Slope \(= \frac{2398 - 3808}{42 - 40} = 142 \)
(d) Slope \(= \frac{2989 - 2948}{44 - 42} = \frac{121}{2} = 66 \)

From the data, we see that the patient’s heart rate is decreasing from 71 to 66 heartbeats/minute after 42 minutes. After being stable for a while, the patient’s heart rate is dropping.

6. (a) \(y = y(t) = 10t - 1.86t^2\). At \(t = 1\), \(y = 10(1) - 1.86(1)^2 = 8.14\). The average velocity between times \(1\) and \(1 + h\) is

\[v_{ave} = \frac{y(1 + h) - y(1)}{(1 + h) - 1} = \frac{[10(1 + h) - 1.86(1 + h)^2] - 8.14}{h} = \frac{6.28h - 1.86h^2}{h} = 6.28 - 1.86h, \text{ if } h \neq 0.\]

(i) \([1, 2] \colon h = 1, v_{ave} = 4.42 \text{ m/s}\)

(ii) \([1, 1.5] \colon h = 0.5, v_{ave} = 5.35 \text{ m/s}\)

(iii) \([1, 1.1] \colon h = 0.1, v_{ave} = 6.094 \text{ m/s}\)

(iv) \([1, 1.01] \colon h = 0.01, v_{ave} = 6.2614 \text{ m/s}\)

(v) \([1, 1.001] \colon h = 0.001, v_{ave} = 6.27814 \text{ m/s}\)

(b) The instantaneous velocity when \(t = 1\) (\(h\) approaches 0) is 6.28 m/s.

8. (a) \(s = s(t) = 2 \sin \pi t + 3 \cos \pi t\). On the interval \([1, 2]\), \(v_{ave} = \frac{s(2) - s(1)}{2 - 1} = \frac{3 - (-3)}{1} = 6 \text{ cm/s}\).

(ii) On the interval \([1, 1.1]\), \(v_{ave} = \frac{s(1.1) - s(1)}{1.1 - 1} \approx \frac{-3.471 - (-3)}{0.1} = -4.71 \text{ cm/s}\).

(iii) On the interval \([1, 1.01]\), \(v_{ave} = \frac{s(1.01) - s(1)}{1.01 - 1} \approx \frac{-3.0613 - (-3)}{0.01} = -6.13 \text{ cm/s}\).

(iv) On the interval \([1, 1.001]\), \(v_{ave} = \frac{s(1.001) - s(1)}{1.001 - 1} \approx \frac{-3.00627 - (-3)}{1.001 - 1} = -6.27 \text{ cm/s}\).

(b) The instantaneous velocity of the particle when \(t = 1\) appears to be about \(-6.3 \text{ cm/s}\).