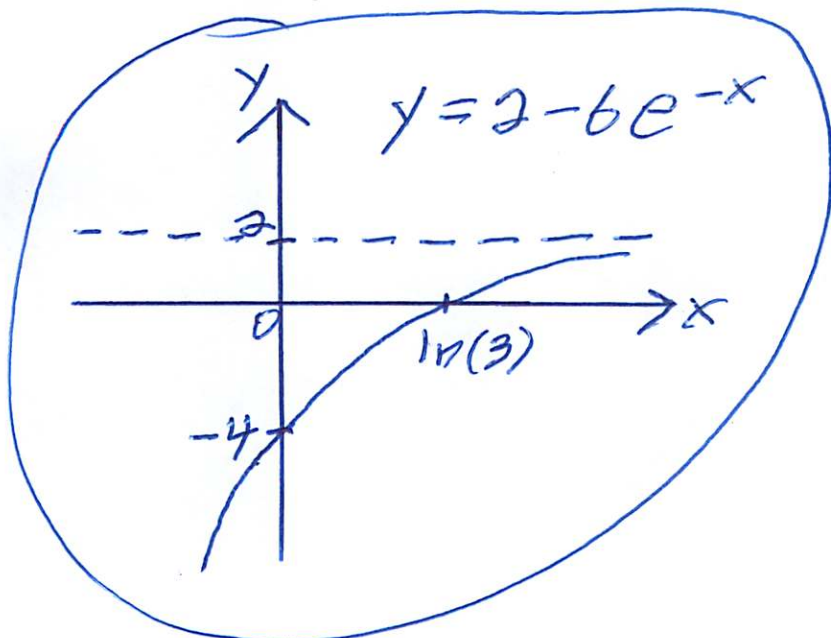
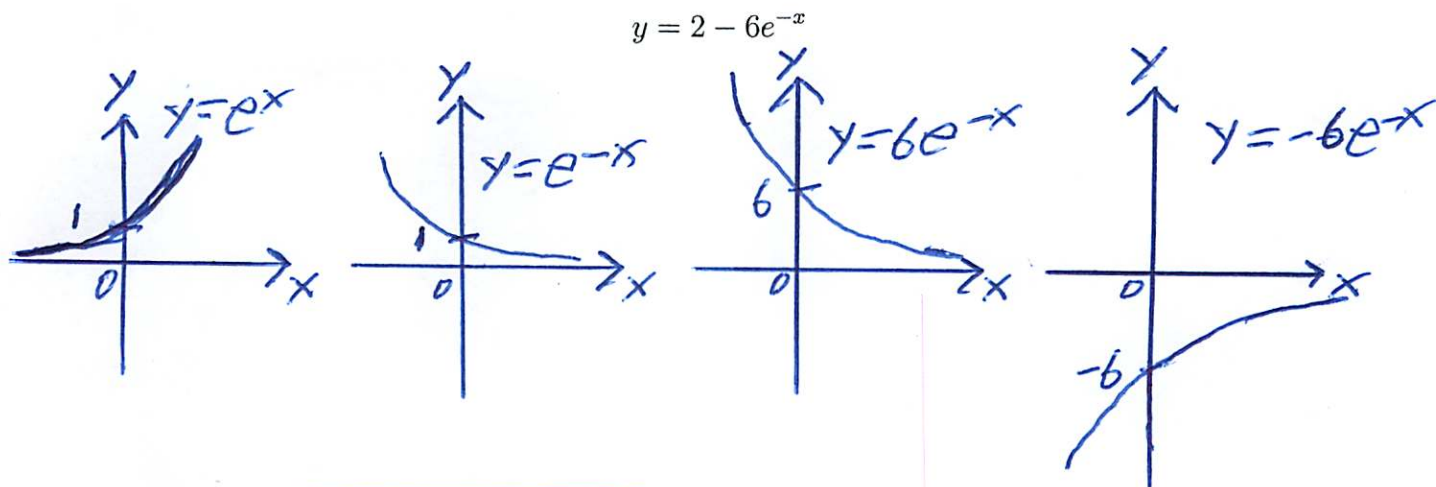


Name

Solutions

- You have 15 minutes
- No calculators
- Show sufficient work

1. (4 points) Carefully sketch a graph of the following function. You should clearly label the value for any intercepts or asymptotes.



horizontal asymptote
at $y = 2$

y-intercept

set $x = 0$

$$y = 2 - 6e^{-0} = -4$$

x-intercept

set $y = 0$

$$0 = 2 - 6e^{-x}$$

$$6e^{-x} = 2$$

$$e^{-x} = \frac{2}{6} = \frac{1}{3}$$

$$\ln(e^{-x}) = \ln\left(\frac{1}{3}\right)$$

$$-x = \ln\left(\frac{1}{3}\right)$$

$$x = -\ln\left(\frac{1}{3}\right) = \ln(3)$$

2. (3 points) Given that $w(x) = \frac{3}{\ln(2e^x + 5)}$, find a formula for $w^{-1}(x)$.

$$y = \frac{3}{\ln(2e^x + 5)}$$

$$x = \frac{3}{\ln(2e^y + 5)} \quad (\text{switch } x \& y)$$

$$x \cdot \ln(2e^y + 5) = 3$$

$$\ln(2e^y + 5) = \frac{3}{x}$$

$$e^{\ln(2e^y + 5)} = e^{\frac{3}{x}}$$

$$2e^y + 5 = e^{\frac{3}{x}}$$

$$2e^y = e^{\frac{3}{x}} - 5$$

$$e^y = \frac{e^{\frac{3}{x}} - 5}{2}$$

$$\ln(e^y) = \ln\left(\frac{e^{\frac{3}{x}} - 5}{2}\right)$$

(solve for y)

$$\rightarrow y = \ln\left(\frac{e^{\frac{3}{x}} - 5}{2}\right)$$

$$w^{-1}(x) = \ln\left(\frac{e^{\frac{3}{x}} - 5}{2}\right)$$

3. (3 points) Determine all values of x which satisfy the equation below.

$$\ln(64e^{2x}) = 10$$

$$\ln(64) + \ln(e^{2x}) = 10$$

$$\ln(64) + 2x = 10$$

$$2x = 10 - \ln(64)$$

$$x = \frac{10 - \ln(64)}{2}$$

$$= \frac{10 - \ln(2^6)}{2}$$

$$= \frac{10 - 6\ln(2)}{2} = \boxed{5 - 3\ln(2)}$$