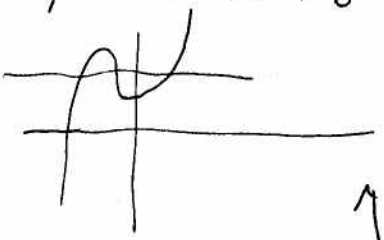
1/5 Calc BC Summer 4

3. yes passes horizontal line test

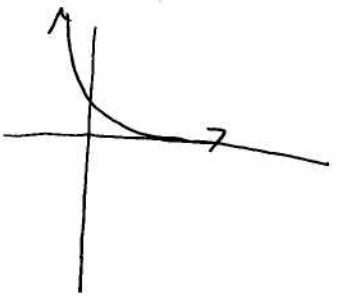
6. NO fails horizontal line test

7. yes passes horizontal line test

9. $y = x^3 - 4x + 6$ NO – fails horizontal line test



12. $y = 2^{3-x}$



yes

15.

$f(x) = x^3 - 1$

$y = x^3 - 1$

$x = y^3 - 1$

$y^3 = x + 1$

$y = \sqrt[3]{x+1}$

$f^{-1}(x) = \sqrt[3]{x+1}$

$(f \circ f^{-1})(x) = \left(\sqrt[3]{x+1}\right)^3 - 1$

$= x + 1 - 1$

$= x$

$(f^{-1} \circ f)(x) = \sqrt[3]{x^3 - 1 + 1} = \sqrt[3]{x^3}$

$= x$

215

18. $f(x) = x^{2/3}$

$y = x^{2/3}$

$x = y^{2/3}$

$y = x^{3/2}$

$f^{-1}(x) = x^{3/2}$

$(f \circ f^{-1})(x) = (x^{3/2})^{2/3} = x$

$(f^{-1} \circ f)(x) = (x^{2/3})^{3/2} = x$

21. $f(x) = \frac{1}{x^2}$

$y = \frac{1}{x^2}$

$x = \frac{1}{y^2}$

$y^2 = \frac{1}{x}$

$y = \frac{1}{\sqrt{x}}$

$f^{-1}(x) = \frac{1}{\sqrt{x}}$

$(f \circ f^{-1})(x) = \frac{1}{\left(\frac{1}{\sqrt{x}}\right)^2} = \frac{1}{\frac{1}{x}} = x$

$(f^{-1} \circ f)(x) = \frac{1}{\sqrt{\frac{1}{x^2}}} = \frac{1}{\frac{1}{x}} = x$

$y(x-1) = 2x+3$

$y = \frac{2x+3}{x-1}$

$f^{-1}(x) = \frac{2x+3}{x-1}$

24. $f(x) = \frac{x+3}{x-2}$

$x = \frac{y+3}{y-2}$

$x(y-2) = y+3$

$xy - 2x = y+3$

$xy - y = 2x+3$

$(f \circ f^{-1})(x) = \frac{\frac{2x+3}{x-1} + 3}{\frac{2x+3}{x-1} - 2} \cdot \frac{x-1}{x-1}$

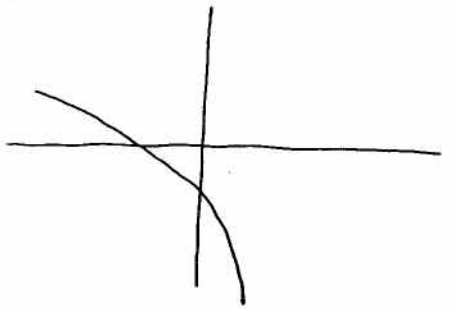
$= \frac{2x+3+3x-3}{2x+3-2x+2} = \frac{5x}{5} = x$

315

24. (cont) $(f^{-1} \circ f)(x) = \dfrac{2\left(\frac{x+3}{x-2}\right)+3}{\frac{x+3}{x-2}-1} \cdot \dfrac{x-2}{x-2}$

$= \dfrac{2x+6+3x-6}{x+3-x+2} = \dfrac{5x}{5} = x$

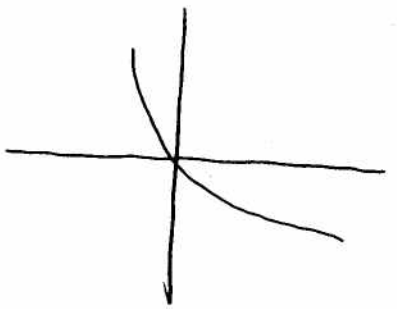
33. $y = 2\ln(3-x) - 4$



Domain $x < 3$

Range All real #'s

34. $y = -3\log(x+2) + 1$

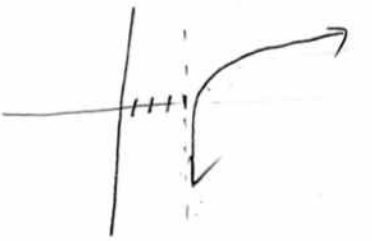


Domain: $x > -2$

Range: All real #'s

4/5

36. $y = \log_3(x-4) = \dfrac{\log(x-4)}{\log 3}$



Domain $x > 4$

Range All Real Numbers

38. $e^{0.05t} = 3$

$0.05t = \ln 3$

$t = \dfrac{\ln 3}{.05} = 20 \ln 3 \approx 21.972$

41. $\ln y = 2t + 4$

$y = e^{2t+4}$ or $y = e^4 e^{2t}$

42. $\ln(y-1) - \ln 2 = x - \ln x$

$\ln(y-1) = x - \ln x + \ln 2$

$y - 1 = e^{(x - \ln x + \ln 2)}$

$y = 1 + \dfrac{e^x}{e^{\ln x}} e^{\ln 2} = 1 + \dfrac{2e^x}{x}$

5/5

46. a) $A(t) = 8\left(\frac{1}{2}\right)^{t/12}$

b) $1 = 8\left(\frac{1}{2}\right)^{t/12}$

$\frac{1}{8} = \left(\frac{1}{2}\right)^{t/12}$

$\left(\frac{1}{2}\right)^3 = \left(\frac{1}{2}\right)^{t/12}$

$3 = t/12$

$t = 36$ hours

47. $p(t) = 375{,}000\,(1.0225)^t$

$1{,}000{,}000 = 375{,}000\,(1.0225)^t$

$(1.0225)^t = \frac{8}{3}$

$\ln(1.0225)^t = \ln\frac{8}{3}$

$t = \frac{\ln\frac{8}{3}}{\ln(1.0225)} = 44.081$

49. $y = -2539.85 + 636.8955 \ln t$

where $t = 60$ corresponds to 1960 etc.

$y(75) = 209.937$ million metric tons

$y(t) = 400$ when $t = 101.0797$

400 million metric tons in 2001.