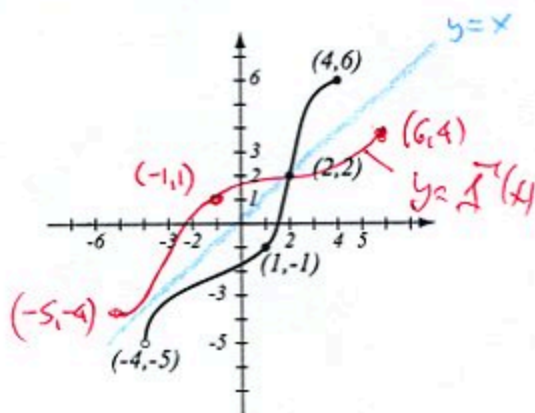


1. (6pts) The graph of a function f is given.
a) Is this function one-to-one? Justify.
b) If the function is one-to-one, find the graph of f^{-1} , labeling the relevant points.



- a) Yes, Graph passes the horizontal line test.
b) Red graph is f^{-1}

2. (12pts) Let $f(x) = \frac{3x+1}{2x-5}$. Find the formula for f^{-1} . Find the ranges of f and f^{-1} .

$$y = \frac{3x+1}{2x-5} \quad x = \frac{5y+1}{2y-3}$$

$$(2x-5)y = 3x+1 \quad f^{-1}(y) = \frac{5y+1}{2y-3}$$

$$2xy - 5y = 3x + 1$$

$$2xy - 3x = 5y + 1$$

$$x(2y-3) = 5y+1$$

Range of f = Domain of $f^{-1} = \{y \mid y \neq \frac{3}{2}\}$
can't have $2y-3=0 \Rightarrow y = \frac{3}{2}$

Range of f^{-1} = Domain of $f = \{x \mid x \neq \frac{5}{2}\}$
can't have $2x-5=0 \Rightarrow x = \frac{5}{2}$

3. (8pts) Evaluate without using the calculator:

$$\log_4 64 = 3 \quad \log_2 \frac{1}{32} = -5 \quad \log_{125} 25 = \frac{2}{3} \quad \log_{\sqrt{6}} b^3 = 6$$

$$4^? = 64 \quad 2^? = \frac{1}{32} = \frac{1}{2^5} = 2^{-5} \quad 125^? = 25 = 5^2 = \sqrt[3]{125}^2 \quad (\sqrt{6})^? = b^3 = ((\sqrt{6})^2)^3 = \sqrt{6}^6$$

$$= 125^{\frac{2}{3}}$$

4. (4pts) Use the change-of-base formula and your calculator to find $\log_7 0.27$ with accuracy 6 decimal places. Show how you obtained your number.

$$\log_7 0.27 = \frac{\ln 0.27}{\ln 7} = -0.672864$$

5. (12pts) Investigate the effect of increased frequency of compounding: for a deposit of \$2,000 and annual interest rate of 3.24%, calculate the amount in the account after 1 year for the frequencies of compounding below.

- Write the general formula for the amount, replacing the variables by numbers, if known.
- Use the table feature on your calculator to quickly compute amounts after 1 year.
- Does compounding more often make a big difference?

Frequency: every	n	Amount after 1 year
year	1	2064.80
quarter	4	2065.59
month	12	2065.77
day	365	2065.86
hour	365.24	2065.86
second	365.24.3600	2065.86

a) $A = 2000 \left(1 + \frac{0.0324}{n}\right)^{n \cdot 1}$
 $= 2000 \left(1 + \frac{0.0324}{n}\right)^n$

c) Part compounding monthly, it makes very little or no difference

6. (3pts) Find the domain of $f(x) = \log_3(4x + 9)$.

Must have $4x + 9 > 0$

$$4x > -9$$

$$x > -\frac{9}{4}$$

Domain $f = \left(-\frac{9}{4}, \infty\right)$

7. (8pts) An object weighing 500 kilograms moving at velocity v meters per second has kinetic energy $E(v) = 250v^2$ Joules.

- Determine the kinetic energy of the object if it is traveling at 10 and 20 meters per second.
- Find a formula for the inverse function and explain what it represents.
- Determine the velocity of the object if its kinetic energy is 60,000 and 120,000 Joules.

a) $E(10) = 250 \cdot 100 = 25000$ Joules

$E(20) = 250 \cdot 400 = 100000$ Joules

b) $E = 250v^2$ $v = \sqrt{\frac{E}{250}}$

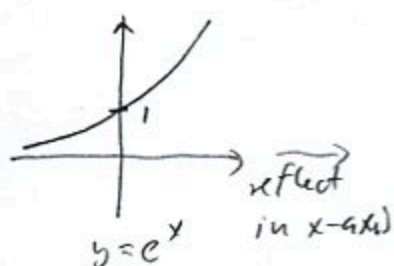
$$\frac{E}{250} = v^2$$

Gives velocity v as a function of kinetic energy!

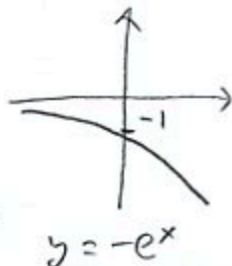
c) $v(60000) = \sqrt{\frac{60000}{250}} = \sqrt{240} = 4\sqrt{15} \frac{m}{s} = 15.491933 \frac{m}{s}$

$v(120,000) = \sqrt{\frac{120000}{250}} = \sqrt{480} = 4\sqrt{30} \frac{m}{s} = 21.908902 \frac{m}{s}$

8. (7pts) Using transformations, draw the graph of $f(x) = 4 - e^x$. Explain how you transform the graph of a basic function in order to get the graph of f . Show at least one point on the graph, and asymptotes to the graph, if any.



reflect in x-axis



shift up 4

