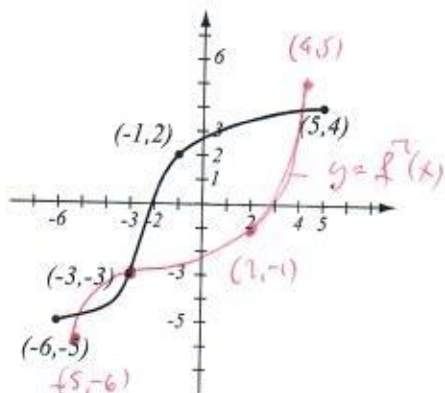


1. (6pts) The graph of a function f is given.
 a) Is this function one-to-one? Justify.
 b) If the function is one-to-one, find the graph of f^{-1} , labeling the relevant points.



2. (12pts) Let $f(x) = \frac{4x-1}{6x+3}$. Find the formula for f^{-1} . Find the ranges of f and f^{-1} .

$$y = \frac{4x-1}{6x+3}$$

$$y(6x+3) = 4x-1$$

$$6xy + 3y = 4x - 1$$

$$6xy - 4x = -3y - 1$$

$$x(6y-4) = -3y-1$$

$$x = \frac{-3y-1}{6y-4} = \frac{3y+1}{4-6y} = f^{-1}(y)$$

$$\text{Range } f = \text{domain } f^{-1} = (-\infty, \frac{2}{3}) \cup (\frac{2}{3}, \infty)$$

can't have $4-6y=0$
 $y = \frac{4}{6} = \frac{2}{3}$

$$\text{Range } f^{-1} = \text{domain } f = \dots$$

can't have $6x+3=0$
 $x = -\frac{3}{6} = -\frac{1}{2}$

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

$$\log_3 9 = 2$$

$$\log_4 \frac{1}{64} = -3$$

$$\log_{25} 5 = \frac{1}{2}$$

$$\log_{b^2} b^3 = \frac{3}{2}$$

$$3^2 = 9$$

$$4^{-3} = \frac{1}{64} = \frac{1}{4^3} = 4^{-3}$$

$$25^{\frac{1}{2}} = 5 = \sqrt{25} = 25^{\frac{1}{2}}$$

$$(b^2)^{\frac{3}{2}} = b^3$$

$$2x = 3$$

$$x = \frac{3}{2}$$

4. (4pts) Use the change-of-base formula and your calculator to find $\log_5 67$ with accuracy 6 decimal places. Show how you obtained your number.

$$\log_5 67 = \frac{\ln 67}{\ln 5} = 2.612522$$

5. (12pts) Investigate the effect of increased frequency of compounding: for a deposit of \$8,000 and annual interest rate of 3.72%, 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	8297.60
quarter	4	8301.78
month	12	8302.73
day	365	8303.19
hour	$365 \cdot 24$	8303.20
second	$365 \cdot 24 \cdot 3600$	8303.20

$$A = P \left(1 + \frac{r}{n}\right)^{nt}$$

$$= 8000 \cdot \left(1 + \frac{0.0372}{n}\right)^n$$

c) In general, little difference, especially when compounding more often than daily

6. (3pts) Find the domain of $f(x) = \ln(4 - 5x)$.

Must have $4 - 5x > 0$

$$5x < 4$$

$$x < \frac{4}{5}$$

~~$$x < \frac{4}{5}$$~~

$$\left(-\infty, \frac{4}{5}\right)$$

7. (8pts) Temperature in degrees Fahrenheit (F) can be computed from temperature in degrees Celsius (C) using the formula $F(C) = \frac{9}{5}C + 32$.

- Convert 13°C and 25°C into degrees Fahrenheit.
- Find a formula for the inverse function and explain what it represents.
- Convert 40°F and 81°F into degrees Celsius.

a) $F(13) = \frac{9}{5} \cdot 13 + 32 = 55.4^\circ\text{F}$
 $F(25) = \frac{9}{5} \cdot 25 + 32 = 77^\circ\text{F}$

$$C = \frac{5F - 160}{9} = \frac{5}{9}F - \frac{160}{9} = \frac{5}{9}(F - 32)$$

b) $F = \frac{9}{5}C + 32 \quad | \cdot 5 \quad \text{solve for } C$

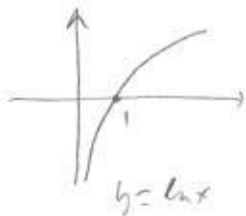
$$5F = 9C + 160 \quad | -160$$

$$9C = 5F - 160$$

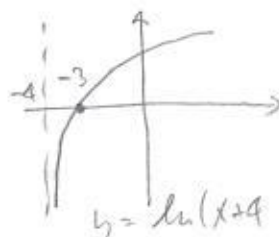
c) $C(40) = \frac{5}{9}(40 - 32) = \frac{40}{9} = 4.444444^\circ\text{C}$

$$C(81) = \frac{5}{9}(81 - 32) = \frac{5}{9} \cdot 49 = 27.222222^\circ\text{C}$$

8. (7pts) Using transformations, draw the graph of $f(x) = 2 \ln(x + 4)$. 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.



shift left 4



stretch vert. by factor 2

