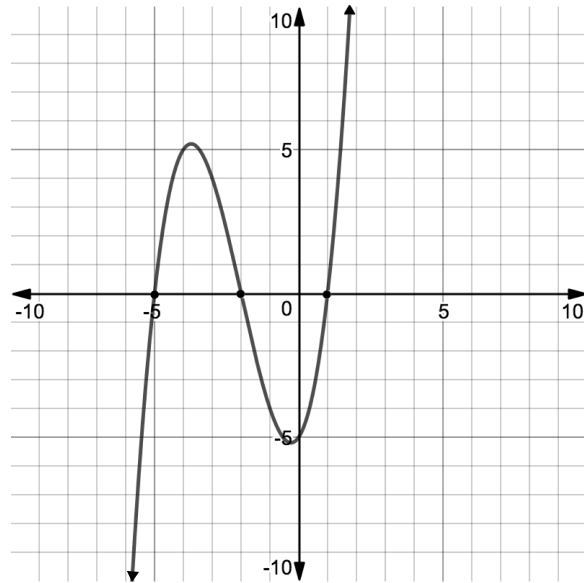


- (1). (4 points) Solve the inequality $f(x) \leq 0$ where the graph of $f(x)$ is given below. Write your solution in interval notation.



$f(x) \leq 0$ on: _____

- (2). (8 points) Solve the following inequality and write your solution in interval notation.

$$\frac{7-x}{x+5} \leq 3$$

- (3). For each of the following functions, determine if the function is a one-to-one function, or if it is not a one-to-one function, Circle the correct answer

(a) (2 points) $f(x) = |2x + 8|$ (i). One-to-one function. (ii). Not one-to-one.

(b) (2 points) $f(x) = \frac{5}{x^2 + 8}$ (i). One-to-one function. (ii). Not one-to-one.

(c) (2 points) $f(x) = x^3 - 3$ (i). One-to-one function. (ii). Not one-to-one.

(4). Suppose

$$f(x) = \frac{5x + 2}{6 - 3x}$$

(a) (4 points) What are the domain and range of $f(x)$ in interval notation?

Domain of $f(x)$: _____

Range of $f(x)$: _____

(b) (6 points) Find the inverse function $f^{-1}(x)$

(c) (4 points) What are the domain and range of $f^{-1}(x)$ in interval notation?

Domain of $f^{-1}(x)$: _____

Range of $f^{-1}(x)$: _____

(5). (8 points) Expand the following logarithmic expression as much as possible:

$$\ln \left(\frac{(x+3)^4(x^2-4)}{\sqrt{5-x}} \right)$$

(6). (4 points) Write the following expression as a single logarithm:

$$\frac{1}{3} \ln(x+2) - 4[\ln(5-x) + \ln(9-x^2)]$$

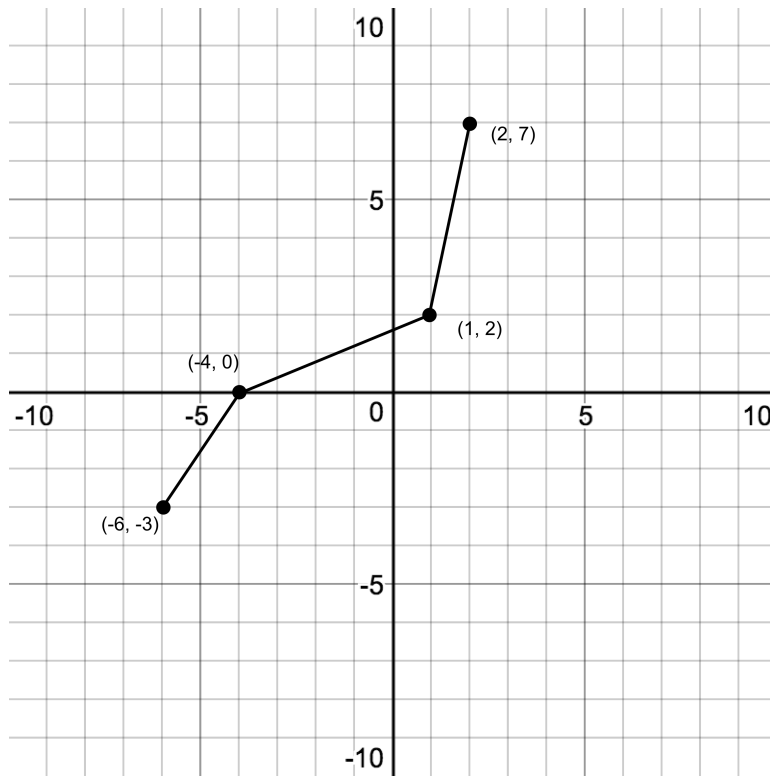
(7). (8 points) Suppose that

$$f(x) = (x-5)^3 + 3 \quad \text{and} \quad g(x) = 5 + \sqrt[3]{x-3}$$

Show that $f(x)$ and $g(x)$ are inverses of each other by using composition of functions (Note: You must show both compositions).

- (8)**. Suppose that Anna needs to borrow \$8,000. She has two possible loans from which to choose:
- (a) (4 points) The first possible loan is at 4.5% per year as simple interest for 6 years. How much total interest would Anna pay for this loan? (*Round your answer to the nearest cent*).
- (b) (6 points) The second possible loan is at 4.25% annual interest rate, compounded continuously, for 6 years. How much total interest would Anna pay for this loan? (*Round your answer to the nearest cent*).
- (9)**. (10 points) Suppose that Tom invests \$10,000 in an account that offers $r\%$ annual interest, compounded quarterly. If the investment increases to \$12,694.34 in 5 years, find the annual rate of interest. (*Round your answer to the nearest tenth of a percent*).

(10). The graph of the function $g(x)$ with domain $[-6, 2]$ is given below.



- (a) (6 points) Draw the graph of the inverse function, $g^{-1}(x)$, and label the corresponding points.
 (b) (2 points) What are the domain and range of $g^{-1}(x)$ in interval notation?

Domain of $g^{-1}(x)$: _____

Range of $g^{-1}(x)$: _____

(11). Suppose that, for a certain real number $b > 0$,

$$\log_b(3) = 2.53 \quad \text{and} \quad \log_b(5) = 4.21$$

(a) (6 points) Find $\log_b(45)$

(b) (4 points) Find $\log_b\left(\frac{1}{25}\right)$

(12). The Richter scale is

$$M = \log\left(\frac{I}{I_0}\right)$$

where M is the magnitude of the earthquake, I is the intensity of the earthquake at the epicenter and I_0 is the intensity of a reference earthquake.

(a) (3 points) Change the equation $M = \log\left(\frac{I}{I_0}\right)$ from logarithmic form to exponential form and then solve for I .

(b) (7 points) The largest recorded earthquake in history occurred in Chile in the year 1960. This earthquake had a magnitude of 9.45 on the Richter scale. In the year 2001, an earthquake of magnitude 4.3 was recorded to be centered at Ashtabula, Ohio. How many times more intense was the Chilean earthquake than the Ashtabula earthquake? (*Round your answer to the nearest integer*).