

Quiz 1

Name:

01/23/2020

This quiz has 5 questions worth 25 points on 3 pages. Try to do as many questions as possible. You can use your calculator.

1. (a) (1 point) Find the slope and y -intercept of the function $2y + 5x - 8 = 0$

Solution: The slope is $-\frac{5}{2}$, and the y -intercept is 4.

- (b) (1 point) Find the initial value and half life of the function $P(t) = 2 \cdot (\frac{1}{3})^t$.

Solution: The initial value is 2. To find the half life, we have to solve $2(1/3)^t = 1 \Rightarrow t \ln(1/3) = \ln(1/2) \Rightarrow t = \frac{\ln(2)}{\ln(3)} \approx 0.63$

- (c) (1 point) Find the amplitude and period of the sinusoidal function $y = -\frac{2}{\pi} \sin(\frac{2}{\pi}x + 3) - 1$

Solution: The amplitude is $\frac{2}{\pi}$ and the period is $\frac{2\pi}{2/\pi} = \pi^2$.

2. (4 points) Mark following functions with 'Odd', 'Even' or 'Neither'

- $(x + 2)^2 - (x^2 + 2^2)$
- e^{x^2}
- $\ln(\frac{x+1}{x-1})$
- $\cos(x^3 + 1)$

Solution:

- Since $(x + 2)^2 - (x^2 + 2^2) = x^2 + 4x + 4 - x^2 - 4 = 4x$. *Odd.*
- Let $f(x) = \ln(\frac{x+1}{x-1})$, then $f(-x) = \ln(\frac{-x+1}{-x-1}) = \ln(\frac{x-1}{x+1}) = -\ln(\frac{x+1}{x-1}) = -f(x)$. *Odd.*
- $e^{(-x)^2} = e^{x^2}$. *Even.*
- *Neither.*

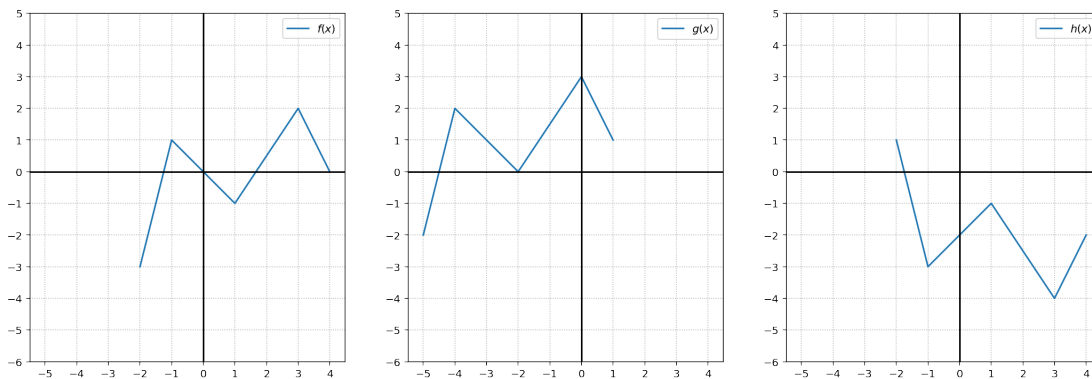
3. (2 points) Solve the equation $e^{\log(x)} = 10^{\ln(10)}$

Solution: Applying natural log to both sides, we get

$$\log(x) = \ln(10^{\ln(10)}) = \ln(10) * \ln(10) = (\ln(10))^2$$

So $x = 10^{(\ln(10))^2} \approx 200400.18$

4. The graph of a function $f(x)$ is shown below. The domain of $f(x)$ is $-2 \leq x \leq 4$.



(a) (6 points) Each of the function $g(x)$ and $h(x)$ shown below is a transformation of the function $f(x)$. Write a formula for each function in terms of $f(x)$.

- $g(x) =$ _____
- $h(x) =$ _____

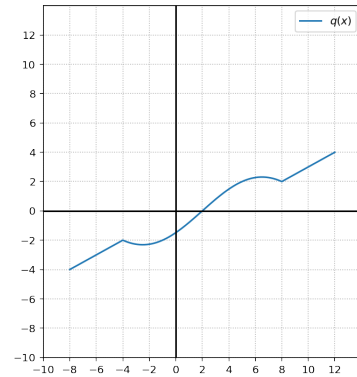
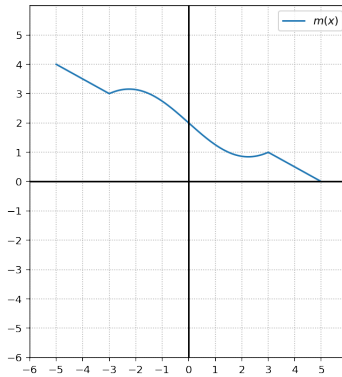
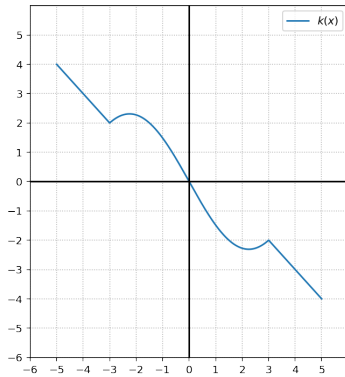
Solution: $g(x) = f(x + 3) + 1$ and $h(x) = -f(x) - 2$.

(b) (4 points) Determine the domain and range of the function $j(x) = -2f(x - 6) + 3$

Domain: _____ $\leq x \leq$ _____, Range: _____ $\leq y \leq$ _____

Solution: Domain: $4 \leq x \leq 10$, Range: $-1 \leq y \leq 9$.

5. A part of the graph of a function $k(x)$ with domain $-5 \leq x \leq 5$ is given below. Both $m(x)$ and $q(x)$ are obtained from $k(x)$ by one or more transformations. In each case, circle *all* possible formulas for the function shown. Graphs are **NOT** drawn on the same scale.



- (a) (3 points) $m(x) =$

- | | |
|-----------------------------|-------------------|
| (A) $\frac{1}{2}k(x) - 2$ | (G) $2k(x) + 2$ |
| (B) $\frac{1}{2}k(x) + 2$ | (H) $-2k(x) - 2$ |
| (C) $-\frac{1}{2}k(-x) - 2$ | (I) $-2k(-x) - 2$ |
| (D) $-\frac{1}{2}k(-x) + 2$ | (J) $-2k(x) + 2$ |
| (E) $-\frac{1}{2}k(x) - 2$ | (K) NONE OF THESE |
| (F) $2k(x) - 2$ | |

Solution: (B) and (D).

- (b) (3 points) $q(x) =$

- | | |
|----------------------|----------------------|
| (A) $k(2x + 2)$ | (G) $k(0.5x + 2)$ |
| (B) $k(-2x - 2)$ | (H) $k(0.5(x - 2))$ |
| (C) $-k(2x + 2)$ | (I) $k(2(x + 1))$ |
| (D) $k(-2x + 2)$ | (J) $-k(0.5(x - 2))$ |
| (E) $-k(0.5(x + 2))$ | (K) NONE OF THESE |
| (F) $-k(0.5x - 2)$ | |

Solution: (J)