

Due by 9am on September 8. Please upload your solutions to Canvas as one PDF file. Do not forget to attach the honor code. Each problem is worth 10 points.

(1) Find the domain of the function.

(a)  $f(x) = |x|$

(d)  $g(t) = \cos \frac{1}{t}$

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

(e)  $f(x) = \frac{2x + 1}{(x - 3)(x + 4)}$

(c)  $g(t) = \sqrt{2 - t}$

(2) Determine whether the function is even, odd, or neither.

(a)  $f(x) = x^5$

(b)  $g(t) = t^3 - t^2$

(c)  $F(t) = \frac{1}{t^4 + t^2}$

(d)  $g(t) = 2^t - 2^{-t}$

(3) Complete the square and find the minimum or maximum value of the quadratic function.

(a)  $y = x^2 + 2x + 5$

(b)  $y = 2x^2 - 4x - 7$

(4) Calculate the composite functions  $f \circ g$  and  $g \circ f$ .

(a)  $f(x) = \sqrt{x}$ ,  $g(x) = x + 1$

(b)  $f(x) = 2^x$ ,  $g(x) = x^2$

(5) Find the equation of the line.

(a) Line passing through  $(-1, 4)$  and  $(2, 6)$ .

(b) Line of slope 6 through  $(9, 1)$ .

(c) Line through  $(2, 3)$  parallel to  $y = 4 - x$

(d) Horizontal line through  $(-3, 5)$ .

(6) Are the lines  $y = 2x + 1$  and  $y = -2x - 4$  perpendicular?

(7) Show that  $x^2 + 3x + 3 \geq 0$  for all  $x$ .

(8) The position of a particle at time  $t$  is  $s(t) = t^3 + t$ . Compute the average velocity over the time interval  $[1, 4]$ .

(9) The height of a projectile fired in the air vertically with initial velocity 25 m/s is

$$h(t) = 25t - 4.9t^2 \text{ m.}$$

(a) Compute  $h(1)$ . Show that  $h(t) - h(1)$  can be factored with  $(t - 1)$  as a factor.

(b) Using part (a), show that the average velocity over the interval  $[1, t]$  is  $20.1 - 4.9t$ .

(10) If a rock is thrown upward on the planet Mars with a velocity of 10 m/s, its height in meters  $t$  seconds later is given by  $y = 10t - 1.86t^2$ .

(a) Find the average velocity over the given time intervals:

(i)  $[1, 2]$

(iv)  $[1, 1.01]$

(ii)  $[1, 1.5]$

(v)  $[1, 1.001]$

(iii)  $[1, 1.1]$

(b) Estimate the instantaneous velocity when  $t = 1$ .