MCS107,HW4
(Functions, Lines)

Q1. Find the domains of the functions;

a) $f(x) = \dfrac{\sqrt{2x-5}}{x^2+4}$ b) $f(x) = \dfrac{2x}{x^3-8} - \dfrac{x}{x-4}$ c) $f(x) = -2(4-x)^{\frac{1}{2}} + 5 - (x+1)$

Ans: a) $[6, \infty)$ b) $(-\infty, 2) \cup (2,4) \cup (4, +\infty)$ c) $(-\infty, 4]$

Q2. a) If $f(x) = x^2 - 3x + 4$, then find $f(2+h) - f(2)$.
b) If $f(x) = 21$, find $f(-8)$ and $f(21)$.

Ans: a) $h^2 + h$ b) both 21

Q3. Consider the function f defined by

$$f(x) = \begin{cases} -x & : -2 \le x < 0 \\ x & : 0 \le x < 2 \end{cases}$$

a) Sketch the graph   b) Find $f(1)$ c) Find $Dom f$

Q4. If $f(x) = \frac{1}{2x+3}$, then find $\frac{f(x+h)-f(x)}{h}$ and simplify.

Q5. Given the function

$$f(x) = \begin{cases} x^2 & : -1 \le x < 0 \\ 2x+1 & : 0 \le x < 1 \\ -x & : 1 \le x < 2 \end{cases}$$

Find: (a) the domain   (b) $f(0)$ (c) $f(\frac{1}{2})$ (d) $f(-\frac{1}{2})$ (e) $f(-\frac{1}{2})$

Q6. If $h(x) = (5x+3)^6$, find functions f and g such that $h(x) = f(g(x))$.

Q7. Determine the x- and y-intercepts of the graph of $y = x^2 + x - 12$.

Q8. (a) Sketch the graph of $y = 2x + 6$,   (b) Determine the intercepts,   c) Find $Dom f$.

Q9. Find the inverses of the functions;
a) $f(x) = 3x + 7$ (b)$f(x) = 5x - 12$
Q10. Consider the function f defined by

$$f(x) = \begin{cases} x & : 0 \le x < 3 \\ x-1 & : 3 \le x \le 5 \\ 4 & : 5 < x \le 7 \end{cases}$$

a) Sketch the graph   b) Find $f(1), f(3), f(6)$ c) Find $Dom f$

Q11. Consider the function f defined by

$$f(x) = \begin{cases} 2x+1 & : -1 \le x < 2 \\ 4 & : x \ge 2 \end{cases}$$

a) Sketch the graph   b) Find $f(1), f(0)$ c) Find $Dom f$

Q12. Consider the function f defined by

$$f(x) = \begin{cases} x+1 & : 0 < x \leq 3 \\ 4 & : 3 < x \leq 5 \\ x-1 & : x > 5 \end{cases}$$

a) Sketch the graph   b) Find $f(1), f(4), f(11)$ c) Find $Dom f$

Q13.Find the slope of the line passing through the points $(5, -3)$ and $(2, -1)$.

Q14.Find the slope of the line passing through the points $(3, 9)$ and $(2, -5)$.

Q15.The slope of the line passing through the points $(4, 9)$ and $(6, k)$ is 5. Find k.

Q16.For the line $y = 7x - 3$, find (a) the slope and (b) the y-intercept.

Q17.Find the slope of the line $4x - 8y + 5 = 0$, sketch its graph.

Q18. Find the slope of the line $3x + 9y - 7 = 0$, sketch its graph.

Q19. Find the slope of the line $5x + y + 8 = 0$., sketch its graph.

Q20. Find an equation of the line that passes through the origin and that has slope -5.

Q21. Find a general linear equation of the line that passes through point $(1, -2)$ and has slope 3.

Q22. Find a general linear equation of the line that passes through point $(-6, 4)$ and has slope -2.

Q23. Find a general linear equation of the line that passes through the points $(-2, 5)$ and $(5, 2)$.

Q24. Find the slope of the line $4x + 5y + 3 = 0$. Sketch its graph.
Q25. Find the slope of the line $x = 4$. Sketch its graph.

Q26. Find the y-intercept of the line determined by the points $(-1, -4)$ and $(-2, 5)$.