PDEV 100
Exam 3
Review Sheet
Answers

This review sheet is intended to remind you of the concepts that you are expected to understand for the exam. It is by no means a complete representation of what could be on the exam. You are responsible for everything discussed in the notes, on labs and in the suggested homework exercises. You should work these on a separate piece of paper.

1. Determine whether each of the following relations is a function. If it is a function find the domain and range.

   (a) Yes. Domain: $\{1, 2, 3, 4\}$, Range: $\{1, 2, 3, 4\}$

   (b) No.

   (c) No.

   (d) Yes. Domain: $\{1, -1, 2\}$, Range: $\{2, 3, 7\}$

2. Use the functions $f(x) = 2x + 3$, $g(x) = x^2 + 3x - 2$, and $h(x) = \frac{x}{x^2-2x-8}$ to evaluate the following.

   (a) 1
   (b) -2
   (c) $-1/9$
   (d) -3
   (e) undefined
   (f) $9/16$
   (g) $-5/9$
   (h) 3
   (i) $x = 9/2$
   (j) $x = -1$ or -2
   (k) $x^2 + 5x - 1$
   (l) $2a - 1$
   (m) 2
   (n) 7
   (o) $4x^2 + 18x + 16$
   (p) -4
   (q) $2x^2 + 6x - 1$
   (r) -1

3. Determine the domains of the following functions.

   (a) $\{x | x \neq -3/2\}$
   (b) $\{x | x \neq 2 \text{ or } 4\}$
   (c) $\{x | x \neq -1/2 \text{ or } 7\}$

4. Simplify the following rational expressions.

   (a) $\dfrac{x+3}{x-4}$
   (b) $\dfrac{y-3}{y^2-3y+9}$
   (c) $\dfrac{3x+2}{x-1}$
   (d) $\dfrac{x+2}{x+4}$

5. Divide using long division

   (a) $x^2 + 2x - 3$

   (b) $2x^2 - 3x + 2$

   (c) $2x^2 + x - 4 + \frac{8}{x+7}$

   (d) $x^2 + 6x + 5$

6. Perform the following operations.

   (a) $\dfrac{x-1}{6}$

   (b) $x - 2$

   (c) $\dfrac{10x}{x^2+16}$

   (d) $\dfrac{(x-4)(x+4)}{2x-3}$

   (e) $\dfrac{4x-2}{x^2-4}$

   (f) $\dfrac{-9x+9}{(x+3)(x-3)}$

   (g) $\dfrac{2x^2+15x+30}{(x-2)(x+5)}$

   (h) $\dfrac{-x^2+2x+7}{(x+3)(x+2)}$

7. Simplify the following complex expressions.

   (a) $\dfrac{3x^2+7x}{x^3+2x^2-4x-8}$

   (b) 2

8. Solve the following equations.

   (a) $x = -9/5$

   (b) $x = 8$

   (c) No Solution. You get $x = -3/2$.

   (d) $x = 10$ only.

9. Let a be the number. Then $a + 2/a = 11/3$. Solving for a gives $2/3$ or 3.

10. Let x be the speed of the boat. Then $x + 30$ is the speed of the car. We have that $\frac{240}{x+30} = \frac{80}{x}$. If you solve you get $x = 20$. The boat is traveling 20 mph and the car is traveling 60 mph.

11. Let x be the speed of the current, then the boat travels $6-x$ mph against the current and $6+x$ mph with current. Thus, it takes the boat $\frac{18}{6-x}$ hours to go upstream and $\frac{18}{6+x}$ to go downstream. This gives you the equation $\frac{18}{6-x} + \frac{18}{6+x} = 8$. If you solve you get $x = 3$. The current is 3 mph.

12. Let x be the speed of the wind, then the airplane travels $200-x$ mph agains the wind and $200+x$ mph with the wind. Thus, it takes the airplane $\frac{1200}{200-x}$ hours to go against the wind and $\frac{1200}{200+x}$ with the wind. This gives you the equation $\frac{1200}{200-x} + \frac{1200}{200+x} = 12.5$. Solving gives you $x = 40$. The wind speed is 40 mph.