Math 125 Exam #1 Key (Fall 2022)

1 $f(-3) = \sqrt{6}$ and $f(x+1) = \sqrt{(x+1)^2 + (x+1)}$.

2a $D_\kappa = \{x \mid 1 - x < 0\} = \{x \mid x > 1\} = (1, \infty)$.

2b $D_V = \{r \mid r \geq 0,\ r \neq 8\} = [0, 8) \cup (8, \infty)$.

3 First,

$$(g/f)(x) = \frac{-\dfrac{\sqrt{2x}}{x-6}}{\dfrac{1}{x-3}} = \frac{(3-x)\sqrt{2x}}{x-6}.$$

Now, $D_f = \{x \mid x \neq 3\}$, $D_g = [0, 6) \cup (6, \infty)$, and $f(x)$ is never 0. With these facts we find

$$D_{g/f} = \{x \mid x \in D_f \cap D_g \ \&\ f(x) \neq 0\} = [0, 3) \cup (3, 6) \cup (6, \infty).$$

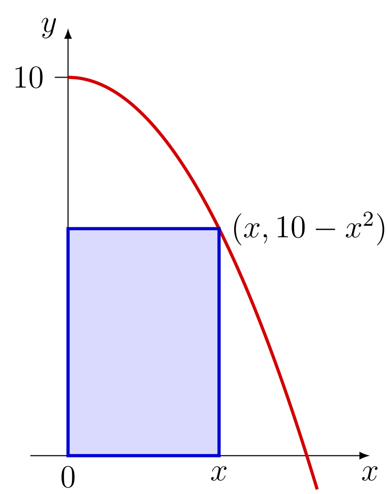
4 $-1 = f(2) = \dfrac{7}{C-4}$, and so $C = -3$.

5 $D_f = [-5, 5)$ and $R_f = [-4, 5]$. Definition follows:

$$f(x) = \begin{cases} 3x + 11, & -5 \leq x < -2 \\ 5, & -2 \leq x < 0 \\ \frac{1}{5}x - 3, & 0 \leq x < 5 \end{cases}$$

6 $y = x^2 \xrightarrow{(1)} y = (-x)^2 \xrightarrow{(2)} y = [-(x-3)]^2 \xrightarrow{(3)} f(x) = [-(x-3)]^2 - 12$.

7 $A(x) = x(10 - x^2)$, and since the x-intercept of the parabola in Quadrant I is $\sqrt{10}$, the domain of A must be $(0, \sqrt{10})$. See figure below.



8 Solving $2x^2 - 3x - 1 = 0$, we get $x^2 - \frac{3}{2}x + (\frac{3}{4})^2 = \frac{1}{2} + (\frac{3}{4})^2$, or $(x - \frac{3}{4})^2 = \frac{17}{16}$, which upon taking the square root yields

$$x = \frac{3 \pm \sqrt{17}}{4}.$$

These are the zeros of p.

9 From $u(x) = 0$ factorization gives $(x^2 - 4)(x^2 - 6) = 0$, and so the zeros of u are $\pm 2, \pm\sqrt{6}$.

10 The vertex is at $(\frac{1}{2}, \frac{3}{2})$, with axis of symmetry $x = \frac{1}{2}$, domain $D_f = (-\infty, \infty)$, and range $R_f = (-\infty, \frac{3}{2}]$.