# Math 120 Exam #2 Key (Spring 2024)

**1** $f(-3) = -\frac{9}{2}$, $f(-x) = \dfrac{x^2}{1-x}$, $f(x+1) = \dfrac{(x+1)^2}{x+2}$.

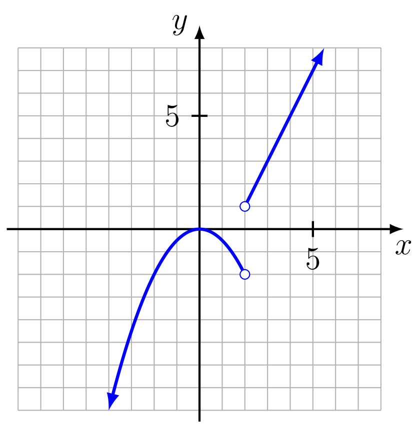
**2a** $h(-1)$ is undefined, $h(2)$ is undefined, $h(4) = 4$.

**2b** $D_g = [-3,-1) \cup [0,2) \cup (2,4]$, $R_g = (-1,1] \cup [2,4]$.

**3a** Symmetric about origin only.

**3b** $R(-x) = \dfrac{(-x)^4 - 2(-x)^2 + 3}{(-x)^3} = -\dfrac{x^4 - 2x^2 + 3}{x^3} = -R(x)$, so $R$ is odd.

**4a**




**4b** The graph may help: $D_q = (-\infty, 2) \cup (2, \infty)$, $R_q = (-\infty, 0] \cup (1, \infty)$.

**5** Slope is $\frac{8}{11}$, so $y - 1 = \frac{8}{11}(x+3)$ is the equation, which becomes $y = \frac{8}{11}x + \frac{35}{11}$.

**6** Equation is $y - (-3) = \frac{2}{5}(x-4)$, which in slope-intercept form is $y = \frac{2}{5}x - \frac{23}{5}$. The $y$-intercept is $-\frac{23}{5}$.

**7** $y - 4x + 1 = 0$ becomes $y = 4x - 1$, so the given line has slope 4, and hence $L$ has slope $-\frac{1}{4}$. Equation for $L$ is thus $y = -\frac{1}{4}x + 2$.

**8a** $D_f = (-\infty, -4) \cup (-4, 4) \cup (4, \infty)$.

**8b** $D_r = \{x \mid x \neq 0 \text{ and } 15/x \neq 5\} = (-\infty, 0) \cup (0, 3) \cup (3, \infty)$.

**9a** $D_F = [3, \infty),\ D_G = [-\frac{5}{2}, \infty)$.

**9b** $(F - G)(x) = \sqrt{x-3} - \sqrt{2x+5}$ with $D_{F-G} = D_F \cap D_G = [3, \infty)$.

**9c** $(F/G)(x) = \dfrac{\sqrt{x-3}}{\sqrt{2x+5}}$ with $D_{F/G} = [3, \infty)$.

**10a** $(f \circ g)(x) = f(g(x)) = \sqrt{\dfrac{5}{x-36}}$.

**10b** $D_f = [0, \infty)$ and $D_g = \{x \,|\, x \neq 36\}$, so

$$\begin{aligned} D_{f \circ g} &= \{x \,|\, x \in D_g \text{ and } g(x) \in D_f\} \\ &= \{x \,|\, \tfrac{5}{x-36} \geq 0\} \\ &= \{x \,|\, x > 36\} \\ &= (36, \infty). \end{aligned}$$

**11a** Set $y = f(x)$, and solve for $x$:

$$y = \frac{7-3x}{9x+2} \quad \hookrightarrow \quad 9xy + 2y = 7 - 3x \quad \hookrightarrow \quad x = \frac{7-2y}{9y+3} \quad \hookrightarrow \quad f^{-1}(y) = \frac{7-2y}{9y+3}.$$

**11b** $R_{f^{-1}} = D_f = (-\infty, -\frac{2}{9}) \cup (-\frac{2}{9}, \infty)$ and $R_f = D_{f^{-1}} = (-\infty, -\frac{1}{3}) \cup (-\frac{1}{3}, \infty)$.