Math 1021 Final Review– Answer Key

1. Not a function, one member of the domain corresponds to more than one member of the range.

2. (a) $f(4) = 2$

(b) Domain: [-5,5]

(c) -2,2

(d) Range: [-2,5]

3. (a) $(-\infty, \infty)$ (b) $(-\infty, 5) \cup (5, \infty)$ (c) $(-\infty, \infty)$

(d) $(-\infty, -7) \cup (-7, -5) \cup (-5, \infty)$ (e) $(-\infty, \frac{5}{3}]$ (f) $(0, \infty)$

4. (a) $x^2 - 5x + 2$ (b) $x^2 + 5x - 2$ (c) 3,807 (d) $\frac{-5x+2}{x^2}$

(e) $-5x^2 + 2$ (f) $25x^2 - 20x + 4$

5. (a) $-12x^7y^{11}$ (b) $4x^5 - 4x^4 - 3x^3 + 14x^2 + 4x - 5$

(c) $4x^2 + 12xy + 9y^2$ (d) $x^4 - 16$

(e) $4x^2 - 9y^2$ (f) $-8x^8 + 12x^7 - 4x^6 - 20x^5$

(g) $8x^3 - 36x^2y + 54xy^2 - 27y^3$

6. (a) $(x-5)^2$ (b) $(2x+3)^2$ (c) $(3x-2)(3x+2)$ (d) $(2x-1)(3x+5)$

(e) $(x-2)(x+6)$ (f) $2x(x-2)(x^2+2x+4)$ (g) $(2x+3)(x-1)$

(h) $(3x-2)(4x+5)$ (i) $2xy(y-8)(y-3)$ (j) $(9x-2)^2$

(k) $2y(3x^2-2)(9x^4+6x^2+4)$

7. (a) 1 (b) $\frac{3x^2-5x-4}{12x^3}$ (c) $\frac{2y^2-9y-6}{(y-2)^2(y+2)}$ (d) $\frac{1}{y+1}$

(e) $-\frac{1}{x}$ (f) $\frac{2x-1}{x-2}$ (g) $\frac{1}{2x+3y}$

8. (a) $\frac{x-y}{y}$ (b) $-\frac{1}{x(x+h)}$ (c) $\frac{(x+6)(x-5)}{(x-7)(x-4)}$ (d) $\frac{wz(w-z)}{w^2-wz+z^2}$

9. (a) $x-2+\frac{4x+3}{2x^2+x-1}$, or $x-2, R\ 4x+3$

(b) $2x^2-3x+4+\frac{-26}{3x+4}$, or $2x^2-3x+4, R-26$

(c) $3x^2+2x-5+\frac{2x-5}{x^2-2}$, or $3x^2+2x-5, R\ 2x-5$

10. $x=-1$ **11.** All real numbers except $x=-2, x=-1$ **12.** $x=9$ **(check necessary)**

13. $x=12$

14. a. $2xz\,y^2\sqrt{3xy}$ b. $\frac{2a^2}{3b}\sqrt[3]{a}$ c. $\sqrt[12]{2^4 3^3}$ d. $\sqrt[12]{w}$ e. $\frac{3}{2}x^2$

15. a. $\frac{\sqrt{5x}}{x}$ b. $\sqrt[3]{x^2}$ c. $\frac{\sqrt{x}+1}{x-1}$ d. $\frac{y\sqrt[3]{9x^2y}}{3x^2}$ e. -1

16. a. $(x+1)^{\frac{15}{2}}$ b. $(x-1)^{\frac{3}{2}}(x-2)^{\frac{3}{2}}$ c. $(x)^{\frac{1}{6}}$

17. a. $9x^2$ b. $\frac{2x^2}{y}$ c. $\frac{y\sqrt{x}}{x}=\frac{y\,x^{\frac{1}{2}}}{x}$ d. $\frac{a^{\frac{4}{5}}}{3^{\frac{5}{2}}\ b^{\frac{7}{3}}}$ e. $\sqrt[3]{4x}=4x^{\frac{1}{3}}$

18. a. $11a^2$ b. $(1-2\mathrm{b})\sqrt{6b}$ c. $9-x$ d. $4a-12\sqrt{ab}+9b$

e. $8\sqrt[3]{y^2}-4y$ f. $2y\sqrt[3]{9x^2}$ g. $(10y+7)\sqrt[3]{2y}$ h. $\sqrt[4]{x-1}$

19. Together it would take 5 1/7 hr.

20. The speed of the boat in still water is 24 mph. **21.** 3/2 or 1.5 sec, 44ft.

22. 500 ft by 250 ft. **23.** x = 3/2, 4 **24.** x = 0, 2 **25.** $x=\pm\frac{3}{5}$

26. $x = \pm 2\sqrt{3}$ **27.** $x = 5 \pm 2\sqrt{7}$ **28.** $x = \frac{2 \pm \sqrt{2}}{2}$

29. $y = 1{,}16$ **30.** $x = \sqrt[3]{5}, 1$ **31.** $x = \frac{3 \pm \sqrt{3}}{2}$

32. Since *f(a)=474 and f(b)=1079, f(a) and f(b)* have same signs. Therefore, using the intermediate value theorem, it cannot be determined whether the function f(x) has a real zero between *a=5 and b=6*.

33. a. Has a maximum of 15 real zeros; **b**. has a maximum of 15 *x-intercepts*; **c.** has a maximum of *15−1=14* turning points.

34. a. x-axis ; **b.** Origin.

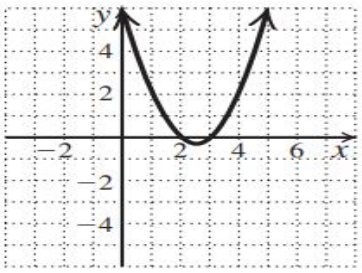
35.

a) Vertex: $\left(\frac{5}{2}, -\frac{1}{4}\right)$

b) Axis of symmetry: $x = \frac{5}{2}$

c) Minimum value: $-\frac{1}{4}$

d)



36. $(-\infty, 3) \cup (7, \infty)$ **37.** $[-3, 1]$ **38.** $(-4{,}2]$

39. $(-\infty, -3] \cup (-2{,}2) \cup [4, \infty)$ **40.** $[-3, -1] \cup [1, \infty)$

41. (d); $x = 2, x = -2, y = 0$ **42. (a);** $x = 2, x = -2, y = 8$

43. (c); $x = 2, x = -2,$ **44. (b);**