Answers to the Math 1314 Final Exam Review

Exercise 1:

(a) $x = -7$ or $x = \frac{7}{3}$ (b) $x = \frac{1}{2}$ (c) $n = -7$ or $n = 9$ (d) $m = -\frac{1}{5}$ or $m = -\frac{5}{2}$

Exercise 2:

(a) $x = \pm\sqrt{\frac{17}{16}} = \pm\frac{\sqrt{17}}{4}$

(b) $k = -6 \pm 2\sqrt{7}$

(c) $x = \pm 2i$

Exercise 3:

(a) $n = 121 \Rightarrow p^2 + 22p + 121 = (p + 11)^2$

(b) $n = \frac{361}{4} \Rightarrow u^2 - 19u + \frac{361}{4} = \left(u - \frac{19}{2}\right)^2$

(c) $n = \frac{1}{9} \Rightarrow x^2 - \frac{2}{3}x + \frac{1}{9} = \left(x - \frac{1}{3}\right)^2$

Exercise 4:

(a) $x = -7 \pm 3\sqrt{6}$ (b) $x = \frac{-3 \pm \sqrt{1033}}{16}$ (c) $y = -1 \pm \frac{\sqrt{15}}{2}$

Exercise 5:

(a) $x = \frac{-3 \pm \sqrt{7}}{2}$ (b) $x = \frac{5 \pm i\sqrt{35}}{6}$

Exercise 6: $x = 1$

Exercise 7:

(a) $r = \frac{\sqrt{A\pi h}}{\pi h}$ (b) $w = \frac{c + \sqrt{c^2 + 4kr}}{2k}$ or $w = \frac{c - \sqrt{c^2 + 4kr}}{2k}$

Exercise 8:

(a) $x = -\frac{1}{2}$ or $x = -1$. Therefore, the sum of the solutions is $-\frac{3}{2}$.

(b) $x = 3$ or $x = 11$. Therefore, the sum of the solutions is 14.

Exercise 9: $P = 44$ yds.

Exercise 10: Shortest Leg: $x = 10$ Long Leg: $x = 24$ Hypotenuse: $x = 26$

Exercise 11: $x = 27$ or $x = -\dfrac{27}{64}$. Hence, the product of the solutions is $-\dfrac{729}{64}$.

Exercise 12: The solution set is $\{1, 2, 4, 5\}$. Hence, the product of the solutions is 40.

Exercise 13:
(a) $x = \dfrac{19}{8}$ or $x = -\dfrac{13}{8}$. Hence, the sum of the solutions is $\dfrac{3}{4}$.
(b) $x = \dfrac{5}{4}$ or $x = -\dfrac{13}{6}$. Hence, the sum of the solutions is $-\dfrac{11}{12}$.

Exercise 14:
(a) $\left(-\infty, \frac{8}{5}\right) \cup (4, \infty)$ (b) $\left(-\infty, \frac{8}{5}\right) \cup (4, 15)$ (c) $(-\infty, 15) \cup (26, \infty)$

Exercise 15:
(a) $\left(-\infty, -\frac{12}{5}\right] \cup \left[\frac{36}{5}, \infty\right)$ (b) $\left(-\frac{1}{4}, \frac{19}{4}\right)$

Exercise 16:
(a) distance $= \sqrt{194}$ (b) midpoint $= \left(\frac{1}{2}, -\frac{3}{2}\right)$

Exercise 17:
Standard Form: $(x+4)^2 + (y-5)^2 = 16$
Center $= (-4, 5)$, Radius $= 4$

Exercise 18:
Standard Form: $(x+6)^2 + (y-6)^2 = 25$
Center $= (-6, 6)$, Radius $= 5$

Exercise 19:
(a) $y = -5x + 28$ (b) $y = \dfrac{2}{5}x + 1$ (c) $y = -\dfrac{5}{6}x + \dfrac{43}{6}$

Exercise 20:
(a) $(-\infty, -3) \cup (-3, \infty)$ (b) $(-3, \infty)$ (c) $(-\infty, -3) \cup (-3, \infty)$

Exercise 21: (a) odd (b) even (c) neither

Exercise 22:
(a) y-axis (b) x-axis (c) none of these (d) x-axis, y-axis, and the origin

Exercise 23: (a) 33 (b) -6 (c) 62

Exercise 24: $A = -6,\ B = 9$

Exercise 25:
Dimensions of the single coop: $x = 15\,ft,\ y = 30\,ft,$
Single coop Area $= 450\,ft^2$

Exercise 26:
(a) Left-End Behavior: Up Left, Right-End Behavior: Down Right
(b) Left-End Behavior: Up Left, Right-End Behavior: Up Right
(c) Left-End Behavior: Down Left, Right-End Behavior: Down Right

Exercise 27: $f(x+1) = x^2 - x + 3$

Exercise 28: $2x + h - 3$

Exercise 29: $(fg)(x) = \dfrac{-1}{x-5}$, $x \neq 1$ and $x \neq -5$

Exercise 30: $\dfrac{13}{4}$

Exercise 31: (a) $(f \circ g)(x) = 6x^2 - 37x + 58$ (b) $(g \circ f)(x) = 6x^2 - x - 2$

Exercise 32:
Starting with the graph of g, translate 2 units to the right and then translate 5 units up.
In other words, the graph of f is obtained from the graph of g by the following successive transformations:

1. Shift the graph of $g(x) = x^2$ two units to the right (obtaining $g(x-2) = (x-2)^2$).
2. Shift the graph of $g(x-2) = (x-2)^2$ five units up (obtaining $f(x) = g(x-2) + 5 = (x-2)^2 + 5$).

Exercise 33:
$f(x) = a(x+1)(x-2)(x^2 - 2x + 5)$ where a is any nonzero real number (We may take $a = 1$, if desired.).

Exercise 34:
Possible Rational Zeros: $\pm 9,\ \pm\dfrac{9}{2},\ \pm\dfrac{9}{4},\ \pm 3,\ \pm\dfrac{3}{2},\ \pm\dfrac{3}{4},\ \pm 1,\ \pm\dfrac{1}{2},\ \pm\dfrac{1}{4}$

Zeros of f: $-1,\ \dfrac{3}{4}$, and 3 Factored form: $f(x) = (x+1)(4x-3)(x-3)$

Exercise 35: Possible Rational Zeros: $\pm 2,\ \pm\frac{2}{3},\ \pm\frac{1}{3},\ \pm 1,\ \pm\frac{1}{2},\ \pm\frac{1}{6}$

Exercise 36: $m = -4$

Exercise 37: 18

Exercise 38:

(a) Vertical Asymptotes: $x = 5$ and $x = -5$ Horizontal Asymptote: $y = 0$

(b) Vertical Asymptote: $x = -\frac{12}{5}$ Horizontal Asymptote: $y = \frac{3}{5}$

(c) Vertical Asymptote: $x = -1$ Horizontal Asymptote: None

Exercise 39:

$x = 0$, Multiplicity: 1

$x = 1$, Multiplicity: 4

$x = -3$, Multiplicity: 2

Exercise 40: $k = \frac{135}{16}$

Exercise 41:

(a) $f^{-1}(x) = \frac{5 - x}{12}$

(b) $f^{-1}(x) = \sqrt[3]{x - 4} + 1$

Exercise 42: $-\frac{7}{4}$

Exercise 43: $3x^3 + 6x^2 + 7x + 29 + \frac{60}{x - 2}$

Exercise 44: $3x^2 - 2x + 4 + \frac{9x + 14}{x^2 - 3}$

Exercise 45:

Solutions: $\left(-8, -\frac{11}{2}\right)$ and $(5, 1)$

Hence, the *sum* of the x-coordinates of the solutions is -3 and the *product* of the y-coordinates of the solutions is $-\frac{11}{2}$.

Exercise 46:

Solution: $(-1, 3, -5)$

Hence, the sum of the coordinates of the solution is $S = x + y + z = -3$.

Exercise 47: $\log_3(r) + \frac{1}{3}\log_3(a) + \frac{1}{3}\log_3(b) - 5\log_3(c)$

Exercise 48:

$x = 8^{1/B}$

There are many values of B that one may choose, namely $B = 1$, or $B = 3$, or $B = \frac{3}{2}$, or $B = \frac{5}{2}$, ...

Exercise 49:

Domain: $(-3, \infty)$ Range: $(-\infty, \infty)$ Vertical Asymptote: $x = -3$

Exercise 50: $m = 5$

Exercise 51:

(a) Solution Set $= \{4\}$. Sum of solutions $= 4$.

(b) Solution Set $= \{6, 8\}$. Sum of solutions $= 14$.

Exercise 52:

(a) Solution Set $= \left\{\dfrac{-2 - \ln(2)}{3}\right\}$.

(b) Solution Set $= \left\{\dfrac{\ln(12) - 2\ln(7)}{\ln(343)}\right\}$.

Exercise 53: $x = -12$

Exercise 54: $x = \dfrac{1}{4}$

Exercise 55: $\begin{bmatrix} 17 & 30 \\ -23 & -9 \end{bmatrix}$