Answers to Math 95 Review Sheets Problems

1) \( z = 25/7 \)

2) a) \( y = \frac{3x-8}{2} \) or \( y = \frac{1}{2}x - 4 \)  
   b) \( x = \frac{7}{r-11} \)

3) The value of the loom after 5 years is $1470.

4) a) Let \( x \) be the original price.  
   Equation: \( (x + 0.40x) - 0.40(x + 0.40x) = 220 \).  
   Answer: The original price was $261.90 .

   Let \( r \) be the single discount rate.  
   Equation: \( 261.90 - 261.90r = 220 \).  
   Answer: \( r = 0.16 \) or 16%

   b) Answer: The selling price should be $95,000.

5) a) 18 ft.  
   aii) 20 sq. ft  
   aiii) 40 cubic ft  
   aiii) 76 sq. ft.

   b) The area of the triangle is 84 sq. in; perimeter 42 in.

   c) Area, approx. 157 sq. cm; Perimeter, approx. 51 cm

6) a) For line \( A \): x-int (10, 0), y-int (0, 15)

   b) x-int is (2, 0); y-int is (0, –3).  
   c) See graph below.

7) a) Slope is 2/5.

   b) Line \( A \): \( -3/2 \), Line \( B \): undefined

   c) Slope is 0

8) \[
\begin{align*}
&\text{undefined} &\text{m=2} \\
&\text{m=0} &\text{m=-2/3}
\end{align*}
\]

9) \( y = -(2/3)x + 6 \); slope \(-2/3\), y-int (0, 6)

10) a) One pair has same slope 4; other pair has slope \(-1\)  
   Slopes 4 and \(-1\) are not negative reciprocals.

   b) Slope of first is \(3/2\), the second \(-2/3\). They are  
   negative reciprocals so the lines are perpendicular.

11) a) The equation of this vertical line is \( x = -25 \).

   b) A line whose equation is \( y = -2 \) is shown above in 6).

12) a) \( y - 5 = \frac{1}{2} (x - 2) \)  
   \( y = -\frac{1}{2} x + \frac{22}{5} \)

   b) \( y = -\frac{1}{2} x - \frac{5}{2} \)

13) a) No. For 15 rides, the cost is less without the pass.  
   b) The difference is $5.

   c) For 20 rides, the cost will be the same.

   d) The cost of the pass is $20.

14) ai) Slope is 1 dollar per ride.

   aii) The cost per ride is $1 for a person with a pass.

   aiii) The vertical intercept indicates the pass costs $20.

   b) The vertical intercept is 1549 thousand which says  
   there were 1,549,000 nurses in 1985.  
   The slope is 34 thousand per year which says the  
   number of nurses is increasing at a rate of 34,000 per year.

15) (8, 2) No ;  
   (2, 0) No ;  
   (5, 1) Yes

16) a) The solution is \( x = 8 \), \( y = 7 \), as shown.

   b) Solution is \( x = 5 \), \( y = 1 \), as shown.

17) a) The solution is \( x = 2 \), \( y = -3 \).

   b) The solution is \( x = -1 \), \( y = -3 \).

18) a) Let \( x \) = dollar amount invested in stocks and \( y \) = dollar amount in bonds. The system is
\[ x + y = 20000 \\
0.15x + 0.108y = 2496 \]

Answer: $8,000 in stocks, $12,000 in bonds

b) 20 gallons of the 30% solution should be mixed with
40 gallons of the 60% solution.

19) a) \(9x^4y^{10}\) b) \(\frac{5x^7}{16y^5}\) c) \(\frac{b^6}{3a^{11}}\)

20) 1

21) a) \(-12x^4 - 4x^2 + 9x - 6\); degree 4; leading coefficient -12.

b) One possibility is \(5x^6 + 7x^2 - 9\).

22) a) \(22x^3 - 14x^2 - 4x + 8\)

b) \(12x^3 + 4x^2 + 12x - 14\)

23) a) \(-10x^5 + 16x^4 - 14x^3 + 6x^2\)

b) \(x^3 + 125\)

c) \(35x^2 + 16x - 3\)

d) \(4x^2 - 9\)

24) a) \(1 + \frac{4}{x}\)

b) \(2x^4 - x + \frac{1}{3x}\)

25) a) \(ab(2a - 5b + 7ab)\)

b) \((x - 3)(7 + y)\)

c) \(-3x(x - 9)\)

26) a) \((x - 3)(x^2 + 4)\)

b) \((3x - 2)(4x + 1)\)

27) a) \((2x - 5)(3x + 7)\)

b) \(5w(3w - 2)(w - 1)\)

28) \((6x - 7y)(6x + 7y)\)

29) a) \((x - 2y)(x^2 + 2xy + 4y^2)\)

b) \((5b + 4)(25b^2 - 20b + 16)\)

30) a) \(x = 5/2\) or \(x = -7/3\)

b) \(x = 5/3\)

c) \(x = 0\) or \(x = 4\)

31) a) \(3x^2 - x + 5 = 0\) b) 2; 3 c) 5 d) 3, -1, 5

32) The fraction is not defined if \(x = 1\) or if \(x = -1\).

33) a) \(\frac{3}{a + 3}\) b) \(-1/2\)

34) a) \(\frac{5(x + 1)}{3}\) b) 4

35) a) 2 b) \(-\frac{1}{2(t - 4)}\) c) \(\frac{3x - 5}{x(x - 5)}\)

36) \(\frac{x + 4}{x^3}\)

37) a) \(x = 1/4\) b) \(x = 0\) or \(x = 4\)

38) About 1053 units should be produced.

The average cost cannot be $4.00 per unit. (Try substituting \(C = 4\) and solve for \(x\). What happens?)

39) a) \(h(0) = -1\), \(h(-4) = 19\), \(h(4) = 2x^2 + 3c - 1\)

\(h(5r) = 50r^2 + 15r - 1\)

b)

<table>
<thead>
<tr>
<th>(F)</th>
<th>-13</th>
<th>4</th>
<th>32</th>
<th>212</th>
<th>451</th>
</tr>
</thead>
<tbody>
<tr>
<td>(g(F))</td>
<td>-25</td>
<td>-15.6</td>
<td>0</td>
<td>100</td>
<td>232.8</td>
</tr>
</tbody>
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40)

\(a) \quad [-1, 6]\)

\(b) \quad x \leq 10\); \((-\infty, 10]\)

41) a) \(x \leq -1\)

\(b) \quad x < 18/5\) or \(x < 3.6\), \((-\infty, 18/5)\)

42) a) \(\sqrt{2}\) b) \(-1/4\)

43) a) \(\sqrt{4.729}\) b) \(\sqrt[3]{34.238}\), rounded to 3 places

44) a) \(L^{1/2} m^{4/5}\)

b) \(\sqrt[2]{(8x)^2}\) or \(\sqrt[2]{8x}\)

45) ai) \(6\) aii) \(25\) aiii) \(27\) b) \(14y^{7/12}\)

46) a) \(2x^2y^2\sqrt{11y}\)

b) \(4x^6\sqrt{2x}\)

47) a) \(3x\)

b) \(\sqrt[3]{2x^2}/3\)

48) a) \(\frac{\sqrt{2}}{2}\)

b) \(\sqrt{\frac{30}{6}}\)

49) \(-2\sqrt{3}\)

50) a) \(10\sqrt{3} + 2\sqrt{6}\)

b) \(\sqrt{6} + \sqrt{10} + \sqrt{21} + \sqrt{35}\)

51) a) \(x = 9\)

b) \(x = 3\) or \(x = -1\)
c) $x = -2 \text{ or } x = -4$

52) The speed was approximately 30 mph.

53) $3\sqrt{5}$

54) a) $x = \pm \sqrt{\frac{8}{3}}$ or $\pm 2\sqrt{2}$

b) $y = \frac{1}{3}(1+4)$, thus $y = 5/3$ or $y = -1$

55) a) $x = \pm 4i$ b) $x = \frac{3\pm 2i}{2}$ or $\frac{3\pm i}{2}$

56) $(x+3)^2 = 14$, thus $x = -3\pm \sqrt{14}$

57) $\sqrt{101}$

58) a) Discriminant is 44; there will be two real solutions.

b) Discriminant is $-76$; there will be two imaginary solutions.

59) a) $x = \frac{-6\pm \sqrt{44}}{-4}$ which when simplified, $x = \frac{3\pm \sqrt{11}}{2}$.

b) $t = -3 + 2i$ or $t = -3 - 2i$

60) a) $x = 3$ or $x = 9$ b) $x = 4 + \sqrt{5}$

61) a) The dimensions are $10\sqrt{5}$ by $20\sqrt{5}$, or approximately 22.4 feet by 44.7 feet.

b) The base is 16.3 inches; the height is 12.3 inches.

62)

63) The solutions are the x-intercepts of the graph, $x \approx -1.5$ and $x \approx 3.5$.

64) a) parabola b) symmetry c) (1, -6) d) minimum

65) a) Opens upward b) Opens downward

66) y-int (0, -5); x-intercepts: (1.35, 0) and (-1.85, 0)

67) $x = 1$ is the equation of the axis of symmetry. The vertex is located at (1, -9).

68) a) Axis of sym.

b) $y$-int is (0, -8)

x-inter (2, 0), (4, 0)

Additional pts

(–3, 7), (5, 7)

b) $y = 3x^2 - 8x + 4$

Axis of sym.

vertex (4/3, -4/3)

y-int (0, 4)

x-inter (2/3, 0), (2, 0)

Additional point

(8/3, 4) sym. to y-int.

69) The parabola opens upward and therefore has a minimum point at the vertex, (3, -32).

70) a) The maximum height was 105 feet.

b) It took 2.5 seconds to reach that height.

c) It hits the ground 5 seconds after launch.

d) When $t = 0$, $h = 5$. So the y-int is 5 feet and this is the height of the platform.

71) $f(-1) = 5/2$, $f(3) = 40$

72) a) The account giving 5.6% compounded semiannually will grow to $7908.28; 5.3\%$ monthly yields $7816.02).

Thus, the first is better by $98.26$.

b) For continuous compounding, the balance will be $7820.58$, for a total interest of $1820.58$.

c) There were approximately 1200 people in 1970. In 2010, 40 years later, the predicted population is about 2260.

73) a) $2^6 = 64$

b) $10^0 = A$

c) $e^{3.5} = x$

d) $\log_3 81 = 4$ and $x = \ln 100$

e) $\log_5 125 = 3$ because 3 is the exponent on 5 to get 125

f) The exponent on 2 is 1.7 because $2^{1.7} = T$.

74) 0.3522; 2.3522; 1.9544; 6.5596; log (–40) does not exist