Pre-Calculus 12 Exp & Log Assignment Solutions Addendum

Solutions to the Pre-Calc Exp & Log Assignment can be found, for the most part, in the old (Principles of Math 12) Exp & Log review solutions. A few questions changed to reflect material focussed on in new course:

#8 & 18 changed and a new #19 was added, so solutions may not match the question number (but they are there!)

Here are the solutions to the changes:

#8 Transform $y = 5^x \longrightarrow y = -5^{2x+3} - 10$

$y = -5^{2(x+1.5)} - 10$

- reflection in x-axis
- horizontal compression about y-axis by factor $\frac{1}{2}$
- translation left 1.5 units & down 10 units

#18 $y = \log_{16} x \longrightarrow y = 5\log_{16}(4-x)$

$y = 5\log_{16}[-(x-4)]$

- reflection in y-axis
- vertical expansion by factor 5
- translation right 4 units

#19 domain, range, intercepts, asymptotes

a) $y = -2^{x-5} + 7$

D: $\{x \mid x \in \mathbb{R}\}$ (for all exp FNS)

R: $\{y \mid y < 7, y \in \mathbb{R}\}$

since $\underbrace{-2^{x-5}}_{<0} + 7$

∴ horizontal asymptote: $y = 7$

x-int: $y = 0$

$0 = -2^{x-5} + 7$

$2^{x-5} = 7$

$(x-5)\log 2 = \log 7$

$x = \frac{\log 7}{\log 2} + 5$

≈ 7.8

y-int: $x = 0$

$y = -2^{-5} + 7$

$= -\frac{1}{32} + \frac{224}{32}$

$= \frac{223}{32} \approx 7.0$

b) $y = 2\log_3(2x-4) - 3$ or $y = 2\log_3[2(x-2)] - 3$

D: $\{x \mid x > 2, x \in \mathbb{R}\}$

since $2x - 4 > 0$

R: $\{y \mid y \in \mathbb{R}\}$ (for all log FNS)

domain shows vertical asymptote at $x = 2$

x-int: $y = 0$

$0 = 2\log_3(2x-4) - 3$

$1.5 = \log_3(2x-4)$

$3^{1.5} = 2x - 4$

$x = \frac{3^{1.5}+4}{2}$

≈ 4.6

y-int: $x = 0 \Rightarrow y = 2\log_3(0-4) - 3 = 2\log_3 4 - 3$

change of base: $y = 2\left(\frac{\log 4}{\log 3}\right) - 3 \approx -0.48$

To graph, use transformations on base FN directly on graph or with mapping notation

- $y = 2^x \rightarrow y = -2^{x-5} + 7$

  $(x, y) \rightarrow (x+5, -y+7)$
- $y = \log_3 x \rightarrow y = 2\log_3 2(x-2) - 3$

  $(x, y) \rightarrow (\frac{1}{2}x + 2, 2y - 3)$

$y = 2^x$ → $y = -2^{x-5} + 7$

x	y	x	y
-2	1/4	3	6.75
-1	1/2	4	6.5
0	1	5	6
1	2	6	5
2	4	7	3
3	8	8	-1
4	16	9	-9

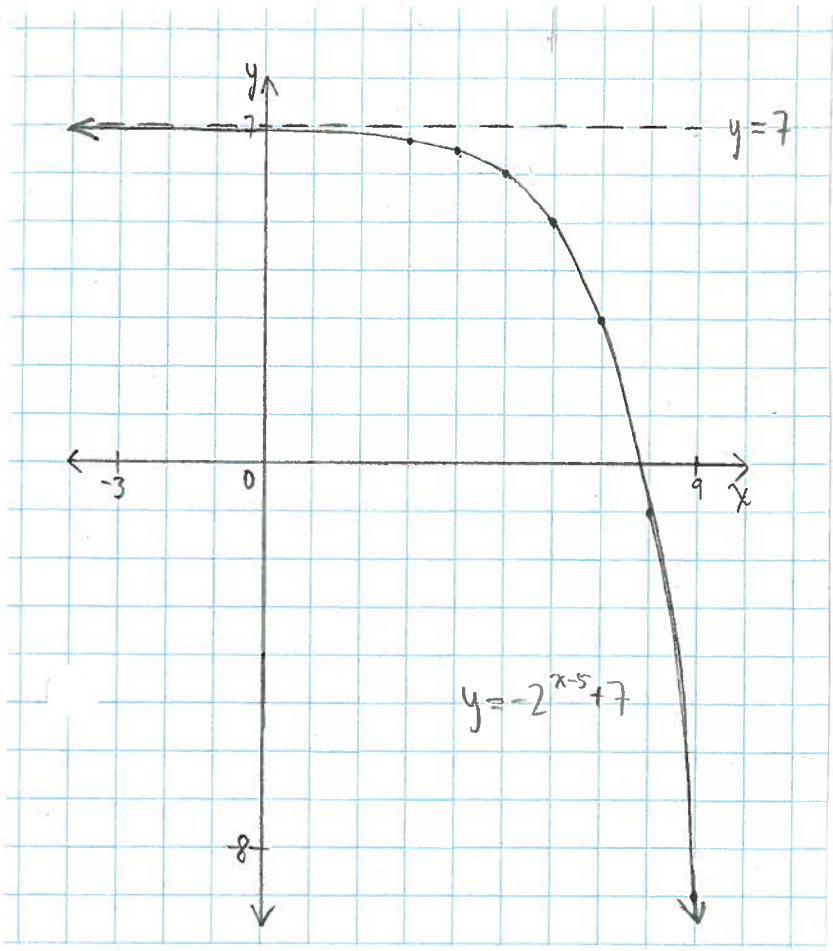
$y = \log_3 x$ → $y = 2\log_3 2(x-2) - 3$

x	y	x	y
1/9	-2	2.05̄	-7
1/3	-1	2.1̄6	-5
1	0	2.5	-3
3	1	3.5	-1
9	2	6.5	1

*see next pg for graphs of a) & b)

19 cont

a)



b)