Name: ______________________ Precalc 12

Extra practice for Chapter 1 TEST

1. Determine the equation in standard form (expanded) of the parabola obtained by stretching $f(x) = x^2$ horizontally by a factor 3, and translating it 1 unit to the right and 5 units up.

$$y = f\left(\frac{1}{3}(x-1)\right) + 5$$

$$y = \left(\frac{1}{3}(x-1)\right)^2 + 5$$

$$\boxed{y = \frac{1}{9}x^2 - \frac{2}{9}x + \frac{46}{9}}$$

2. If (3,-8) is on the graph of $y = f(x)$, which corresponding point is on the graph of $y = 2f\left(-\frac{1}{3}(x-4)\right) + 5$? Us the table below to list the transformations and the corresponding coordinates.

Transformation	Starting point (3,-8)
vertical stretch factor 2	(3;-16)
reflection about y-axis	(-3;-16)
horizontal stretch factor 3	(-9;-16)
translat° 4 units →	(-5;-16)
translat° 5 units ↑	Corresponding point (-5;-11)

3. Determine the inverse of $f(x) = 4x^2 - 16x + 17$.

vertex: $\frac{-b}{2a} = \frac{16}{8} = 2$ (2; 1)

$x = 4y^2 - 16y + 17$

$0 = 4y^2 - 16y + 17 - x$

$$y = \frac{16 \pm \sqrt{16^2 - 4 \times 4(17 - x)}}{8}$$

⋮

or

$f(x) = 4(x-2)^2 + 1$

$x = 4(y-2)^2 + 1$

$\frac{x-1}{4} = (y-2)^2$

$y - 2 = \pm\sqrt{\frac{x-1}{4}}$

$$\boxed{y = 2 \pm \sqrt{\frac{x-1}{4}}}$$

4. a) What is the equation of the function that you get after reflecting $y = f(x)$ around the y-axis and stretching it vertically by a factor 3.

$y = 3f(-x)$

b) Same question with $f(x) = \frac{1}{3x+1}$

$y = \frac{3}{-3x+1}$

5. a) What is the equation of the function that you get after reflecting $y = f(x)$ around the x-axis and stretching it horizontally by a factor $\frac{1}{3}$.

$y = -f(3x)$

b) Same question with $f(x) = x^2 - 5x + 1$

$y = -\left((3x)^2 - 5(3x) + 1\right)$

$y = -9x^2 + 15x - 1$

b) Same question with $f(x) = -3\sqrt{2x - 1}$

$y = 3\sqrt{6x - 1}$

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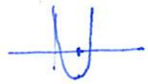

6. Let $f(x) = 2x^2 - 8x + 4$

a) Determine its domain and range. vertex : $(2; -4)$

$D = \mathbb{R}$ $R = \{y \in \mathbb{R} \mid y \geq -4\}$

b) How do you know that the inverse won't be a function?

horizontal line test

c) restrict the domain so that the inverse is a function.

$D_R = \{x \in \mathbb{R} \mid x \geq 2\}$

d) What are the domain and the range of the inverse?

$D_I = \{x \in \mathbb{R} \mid x \geq -4\}$

$R_I = \{y \in \mathbb{R} \mid y \geq 2\}$