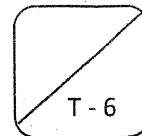
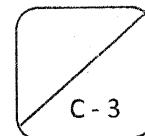


BUR OAK MATHEMATICS DEPARTMENT
QUIZ - EXPONENTIAL TRANSFORMATIONS AND APPLICATIONS



NAME: Solutions

Communication Look Fors:

- Proper labeling of graphs
- Use of statements
- Proper mathematical conventions

1. [K] For the function, $f(x) = 4^{-2x-4} + 3$,

a) Describe all the transformations from the parent function $y = 4^x$. ✓✓✓✓

$$f(x) = 4^{-2(x+2)} + 3$$

- horizontal reflection

horizontal shift 2 units left. $f(x)$

- horizontal compression

vertical shift 3 units up.

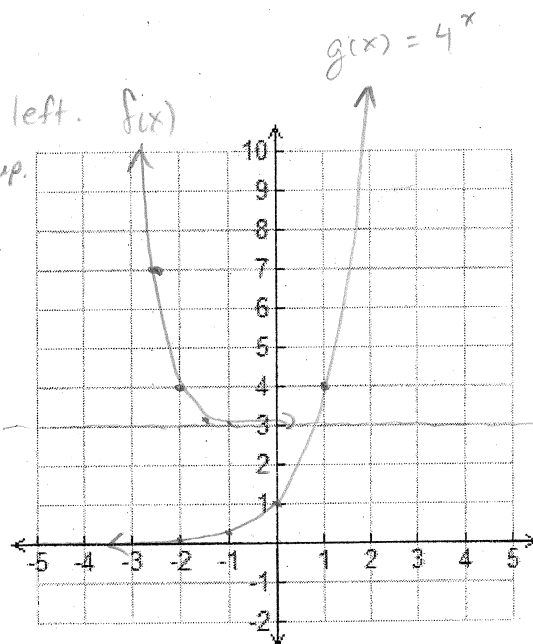
by a factor of $\frac{1}{2}$

b) State the domain and range of the function. ✓✓

$$D: \{x | x \in \mathbb{R}\}$$

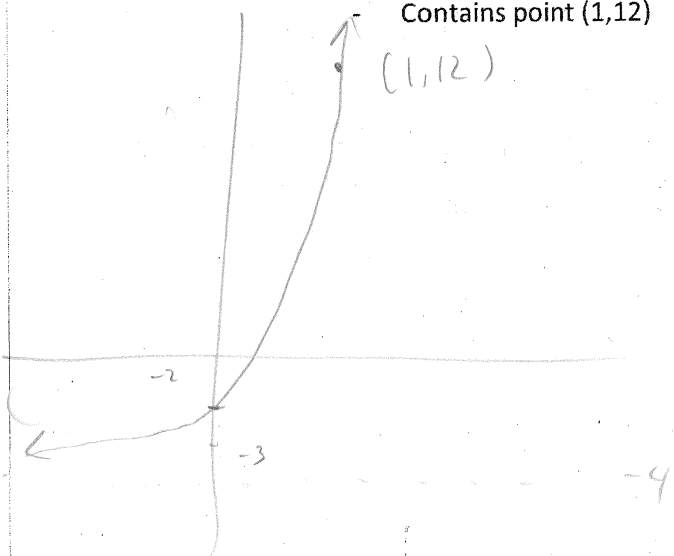
$$R: \{y | y \in \mathbb{R}, y > 3\}$$

c) Sketch and fully label the function $f(x)$ and its parent function on the graph below. ✓✓✓✓✓



2. [T] Determine the equation of the exponential function that has the following description: ✓✓✓

- Range is $\{y | y \in \mathbb{R}; y \geq -4\}$
- The y-intercept is -2
- Contains point (1,12)



$$y = a \cdot b^x - 4 \quad a=2$$

$$y = 2 \cdot b^x - 4 \quad (1, 12)$$

$$12 = 2 \cdot b^1 - 4$$

$$16 = 2 \cdot b$$

$$8 = b$$

$$y = 2 \cdot (8)^x - 4$$

3. [A] A fully charged cell phone battery loses 2% of its charge everyday.

- a) Determine an equation that models the percent charge, C , that remains in the battery after t days. ✓✓

$$b = 1 - 0.02 \\ = 0.98$$

$$C(t) = (0.98)^t$$

- b) Determine the percent charge remaining in the battery after 25 days. ✓

$$C(25) = (0.98)^{25} \\ = 0.603$$

~ 60.3% remaining

- c) Determine when the battery will have half the original charge left. ✓✓

$$0.5 = (0.98)^t$$

$$\log 0.5 = t \log 0.98$$

$$t = \frac{\log 0.5}{\log 0.98}$$

$$= 34.31 \text{ days}$$

4. [T] Solve for x : $\frac{32^{x+2}}{8^{2x-5}} = 2^{3x+1} \cdot 16^{3-2x}$ ✓✓✓

$$\frac{(2^5)^{x+2}}{(2^3)^{2x-5}} = 2^{3x+1} \cdot (2^4)^{3-2x}$$

$$\frac{2^{5x+10}}{2^{6x-15}} = 2^{3x+1} \cdot 2^{12-8x}$$

$$2^{-x+25} = 2^{-5x+13}$$

$$-x+25 = -5x+13$$

$$4x = -12$$

$$x = \frac{-12}{4}$$

$$x = -3$$