

TEST: Chapter 4.1 Form A CALCULATOR PERMITTED

I. Multiple Choice: Place the capital letter of the answer choice in the blank to the left of the number._____ 1. The graph of the function $g(x) = 27^x$ can be obtained from the graph of $f(x) = 3^x$ by

- (A) Horizontally compressing f by a factor of 3 (B) Horizontally stretching f by a factor of 3
(C) Vertically compressing f by a factor of 3 (D) Vertically stretching f by a factor of 3
(E) None of these

_____ 2. Find the range of $f(x) = -3e^{4-5x} - 10$

- (A) $(-\infty, -10)$ (B) $[-10, \infty)$ (C) $(-\infty, -10]$ (D) $(10, \infty)$ (E) $(-10, \infty)$

_____ 3. Given a parent function $y = e^x$, which of the following equations represents a horizontal shift of the parent function 3 units right?

- (A) $f(x) = 3e^{-2x+6} + 3$ (B) $f(x) = 3e^{2x+6} - 3$ (C) $f(x) = 3e^{-2x-6} + 3$
(D) $f(x) = 3e^{-2x+3} + 3$ (E) $f(x) = 3e^{-2x-3} + 3$

_____ 4. If $f(x) = 2 + \frac{2}{3}e^{\left(\frac{2}{3}x - \frac{5}{3}\right)}$, then compared to the parent function $y = e^x$, the graph of f is

(A) Vertically stretched by a factor of $\frac{3}{2}$

(B) Vertically stretched by a factor of $\frac{2}{3}$

(C) Horizontally compressed by a factor of $\frac{3}{2}$

(D) Horizontally stretched by a factor of $\frac{3}{2}$

(E) Horizontally stretched by a factor of $\frac{2}{3}$

_____ 5. If $f(x) = 3 + \frac{1}{5}(1.001)^{\frac{x}{5}}$, what is $\lim_{x \rightarrow -\infty} f(x)$?

(A) 0 (B) $\frac{1}{5}$ (C) 3 (D) ∞ (E) $-\infty$

_____ 6. An exponential function of the form $y = A \cdot b^x$ passes through the points (0, 2) and (3, 10). What is the y -value when $x = 6$?

(A) 70

(B) 60

(C) 30

(D) 40

(E) 50

_____ 7 Which of the following is not true of the function $f(x) = 3\left(\frac{1}{2}\right)^{x-1} + 4$

- (A) Horizontal asymptote @ $y = 4$ (B) y-intercept @ $(0, 3)$
(C) It is a decreasing function (D) $R:(4, \infty)$ (E) $D:\mathbb{R}$

_____ 8. When $2x^{13} - 3x^4 + 5$ is divided by $x + 1$, the remainder is what?

- (A) 0 (B) 4 (C) 6 (D) 10 (E) 11

_____ 9. For $x > 0$, which of the following is true?

- (A) $3^x > 4^x$ (B) $7^x > 5^x$ (C) $\left(\frac{1}{6}\right)^x > \left(\frac{1}{2}\right)^x$ (D) $9^{-x} > 8^{-x}$ (E) $0.17^x > 0.32^x$



II. Free Response: Show all work in the space provided below the horizontal line. **Use correct units** where appropriate.

10. The number of people at Wassailfest infected with holiday cheer after t minutes is modeled by the function

$$W(t) = \frac{12456}{1 + 56e^{-0.7t}}$$



(a) What was the initial number of Wassailers infected with cheer? (**round** to the nearest person)

(b) After how many minutes will the number of infected Wassailers be 5000? Give an approximation **rounded** to the nearest minute.

(c) After how many minutes is the holiday cheer spreading at the fastest rate? (**round** to the nearest minute)

(d) How many Wassailers are infected after a 15 minutes? (**round** to the nearest person)

(e) According the model, how many people attended Wassailfest?

(f) If the Grinch has a plan to crash the Wassailfest festivities if 75% of the Wassailers get infected with the holiday spirit, after how many minutes will he try to implement his sinister plan? (**round** to the nearest minute)