Name KEY Date 19 CHECKS Period

TEST: Chapter 3.5-4.2 FORM A, CALCULATOR PERMITTED

I. Multiple Choice: Place the CAPITAL letter of the answer choice in the blank to the left of the number.

B 1. The graph of the function $g(x)=2^x$ can be obtained from the graph of $f(x)=8^x$ 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

A 2. What is constant percentage decay **rate** of $P(t)=4.7\left(\frac{1}{5}\right)^t$?

(A) 80% (B) 2% (C) 20% (D) 0.8% (E) 0.2%

D 3. What is the growth **factor** in the equation $M(t)=3\left(\frac{6}{5}\right)^t$?

(A) 3 (B) $\frac{1}{5}$ (C) 20% (D) 1.2 (E) 120%

B 4. What is the equation of the exponential model, $y=Ab^t$, t in **days**, for a quantity that starts with an initial value of 4, and **increases** by a factor of 2 every week?

(A) $y=4(2)^t$ (B) $y=2^{(t/7+2)}$ (C) $y=4(3)^{t/7}$ (D) $y=4\left(\frac{1}{3}\right)^{t/7}$ (E) $y=4^{(t/7+2)}$

E 5. What is the equation of the exponential model, $y=Ab^t$, t in hours, for a quantity that starts with an initial value of 3.4, and **decreases** by 34% every 5 hours?

(A) $y=3.4(0.66)^t$ (B) $y=3.4(0.34)^t$ (C) $y=3.4(1.34)^{t/5}$ (D) $y=3.4(0.34)^{t/5}$ (E) $y=3.4(0.66)^{t/5}$

E 6. Which of the following is equivalent to the function $f(x)=11^{-x}$?

(A) $g(x)=-\left(\frac{1}{11}\right)^{-x}$ (B) $g(x)=\left(\frac{1}{11}\right)^{-x}$ (C) $g(x)=\frac{-1}{11^x}$ (D) $g(x)=-11^x$ (E) $g(x)=\frac{1}{11^x}$

A 7. If a radioactive substance loses one-third of its mass every 26 days, to the nearest day, for what approximate value of t will 13 percent of the original amount of the substance remain?

(A) 131 days (B) 48 days (C) 2 days (D) 5 days (E) 76 days

B 8. A population grows according to an exponential model, $y=A\cdot b^t$. If the population grew from its original population of 4,000 at $t=0$ to a population of 16,000 8 years later at $t=8$. Predict the population at $t=20$.

(A) 100,000 (B) 128,000 (C) 132,000 (D) 145,000 (E) 88,000

E 9. Which of the following are equations of asymptotes for the function $f(x)=\frac{x^2+x^3-6x}{(x-3)(x+2)}$?

I. $x=3$
II. $x=-2$
III. $y=x+2$
IV. $y=1$

(A) I only (B) I & II (C) II & IV (D) I & IV (E) I, II, & III

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

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

$$W(t) = \frac{3456}{1+56e^{-0.1t}}$$

(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 660? 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 24 minutes? (**round** to the nearest person)
(e) According the model, what is a reasonable estimation of the number of people who attended Wassailfest?
(f) If the Grinch has a plan to crash the Wassailfest festivities if at least 55% 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)

10 CHECKS

(a) $W(0) = 60.631 \approx$ 60 or 61 ppl

(b) $W(t) = 660$, $t = 25.816 \approx$ 25 or 26 min

(c) $W(t) = 1728$, $t = 40.253 \approx$ 40 min

(d) $W(24) = 568.461 \approx$ 568 ppl

UNITS: 1 ✓

(e) 3456 ppl

(f) $W(t) = 1900.8$ or $W(t) = 1900$ or $W(t) = 1901$

$t = 42.260$

$t \approx 42$ min

$t = 42.250$

$t \approx 42$ min

$t = 42.262$

$t \approx 42$ min