- **2**. [6 points] Scientists are studying three different populations of bacteria.
  - **a**. [4 points] Population A is doubling every 5 hours.

Show any needed work. Give answers in exact form or rounded to 3 decimal places.

i. What is the growth factor for population A?

Solution: If a is the initial amount and b the growth factor for Population A, then  $ab^5 = 2a$ . Then  $b = 2^{1/5} \approx 1.149$ .

Answer:	$2^{1/5}$

ii. How long does it take population A to triple?

Solution: We solve  $a(2^{1/5})^t = 3a$  to find that  $t = \frac{\ln(3)}{\ln(2^{1/5})}$ .

Answer:  $\approx 7.925$  hours

## **b**. [2 points]

Population B is growing exponentially at a rate of 16% per hour. Population C is growing exponentially at a *continuous* rate of 14% per hour.

Which of these two populations is growing more quickly? Circle your answer, then briefly justify.

POPULATION B

POPULATION C

## Justification:

Solution: Since  $e^{0.14} \approx 1.15$ , Population C is growing at a rate of about 15% per hour, compared to Population B which is growing at 16% per hour.