10 May 2018 Name: .

Test: Statistics, exponential, & polynomial functions

1. In an arithmetic sequence, the first term is 5 and the second term is 7.

   (a) Find the common difference.

   [2]

   (b) Find the tenth term.

   [2]

   (c) Find the sum of the first fifteen terms of the sequence.

   [2]

2. Simplify the expression $\sqrt{x^4y^2}$.

   [2]

3. Carlos puts \$12,500 into an investment account with interest compounded continuously. If the annual interest rate is 3.15% what is the balance after 5 years?

   [5]

4. The expression $(x+a)(x+b)$ can not be written as

   (a) $a(x+b)+b(x+b)$

   (b) $x^2+ax+bx+ab$

   (c) $x^2+(a+b)x+ab$

   (d) $x(x+a)+b(x+a)$

   [2]

5. Consider a geometric sequence where the first term is 138 and the second term is 115.

(a) Find the common ratio, r.

[1]

(b) Find the seventh term.

[2]

(c) Find the least value of n such that the nth term of the sequence is less than 20.

[3]

6. Algebraically determine the values of h and k to correctly complete the identity stated below.

$$3x^3 - 5x^2 + 3 = (x - 2)(3x^2 + hx + 2) + k$$

[4]

7. Three consecutive terms of a geometric sequence are $x - 5$, 8, and $x + 7$.
Find the possible values of x.

[6]

8. A bank account earns interest at a continuous interest rate of 3.925% per year. The initial deposit is \$175. Which function models the value of the balance? [2]

   (a) $P(t) = 175 \cdot 1.04^t$

   (b) $P(t) = 175(1 + 0.03925)^t$

   (c) $P(t) = 175 \cdot 1.03925^t$

   (d) $P(t) = 175 \cdot e^{0.04t}$

9. Write $\sqrt{a^5} \div a^{\frac{1}{2}}$ as an expression with positive, integer exponents.

[3]

10. The function $p(t) = 110e^{0.0325t}$ models the population of a city, in millions, t years after 2010.

    (a) Initially, as of 2010, what is the population in millions?

    [1]

    (b) What is the annual continuous rate, expressed as in percent, that the population increases?

    [1]

    (c) Find the population in 2015, rounded to the nearest million.

    [2]

    (d) In what year will the population be approximately 138 million?

    [2]