23 May 2018 Name: .

Homework: Statistics, exponential, & polynomial functions

1. In an arithmetic sequence, the first term is 5.3 and the second term is 3.7.

   (a) Find the common difference.

   [2]

   (b) Find the tenth term. (use the formula)

   [2]

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

   [2]

2. Simplify the expression $\sqrt{x^6y^2}$.

   [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 7 years, to the nearest dollar.

   [5]

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4. Given the function $f(x) = -x^3 + 2x^2 + 5x - 6$.

   (a) Write down the y-intercept.

   [1]

   (b) Find the x-intercepts.

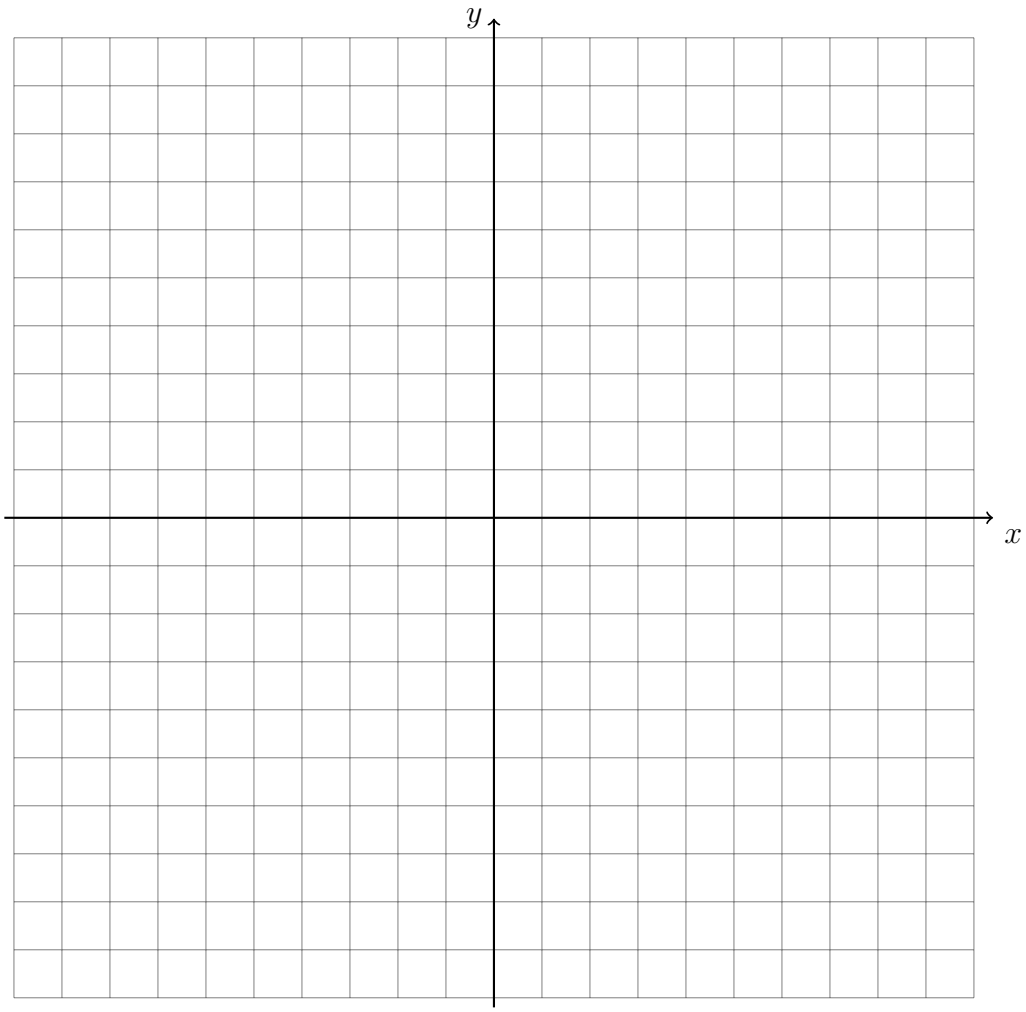
   [2]

   (c) Graph the function on the grid below, carefully passing through the correct intercepts.

   [3]

   (d) What is the maximum value of $f(x)$ over the domain $0 \leq x \leq 5$, to three significant figures?

   [2]



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

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

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

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

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

[2]

6. Consider a geometric sequence where the first term is 112 and the second term is 84.

   (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]

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

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

[4]

8. Three consecutive terms of a geometric sequence are $x - 4$, 6, and $x + 5$.
Find the possible values of x.

[6]

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9. A bank account earns interest at a continuous interest rate of 1.04% per year. The initial deposit is \$175. Which function models the value of the balance? [2]

   (a) $P(t) = 175 \cdot 1.01045^t$

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

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

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

10. Write $\sqrt[3]{a^5} \div a^{\frac{2}{3}}$ as an expression with positive, integer exponents.

[3]

11. The function $p(t) = 110e^{0.045t}$ 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 165 million?

    [2]