

**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  $\sqrt{x^6 y^2}$ .

[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.

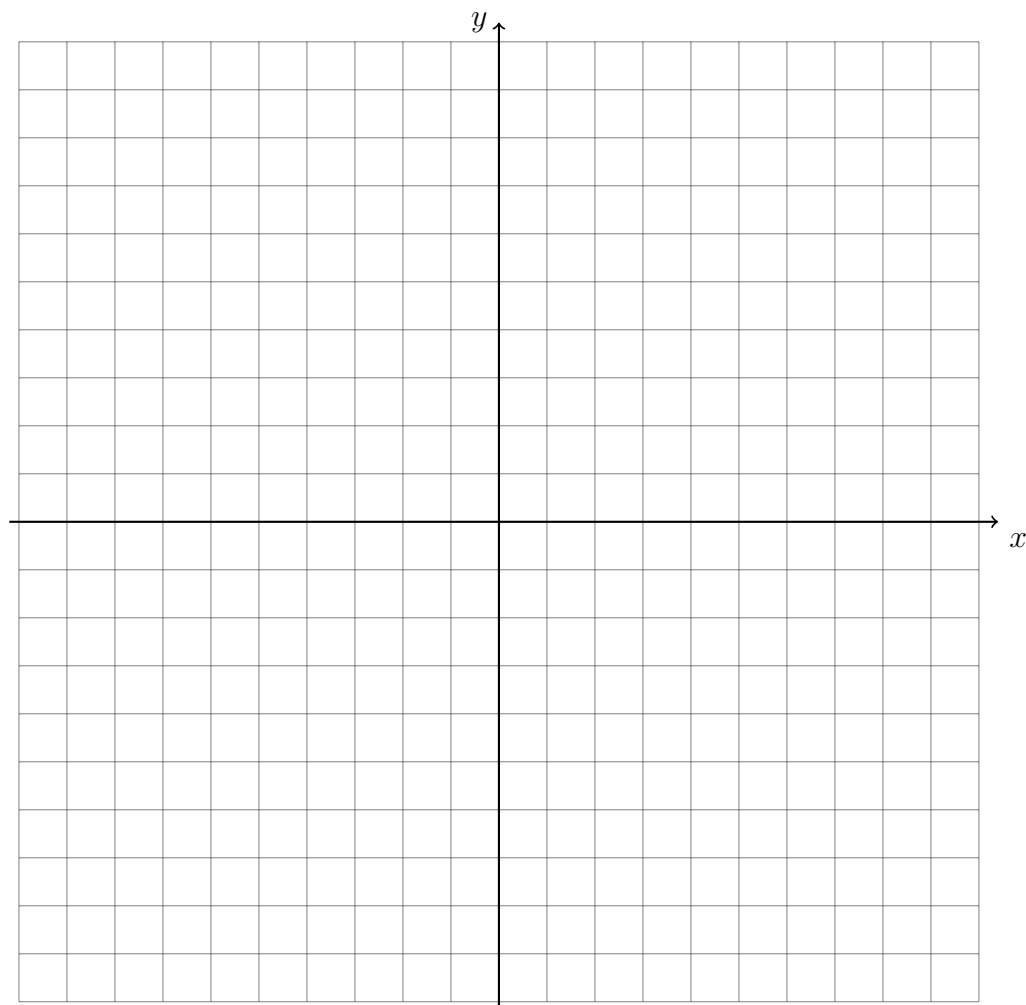
[2]

(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]



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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  $n$ th 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]