

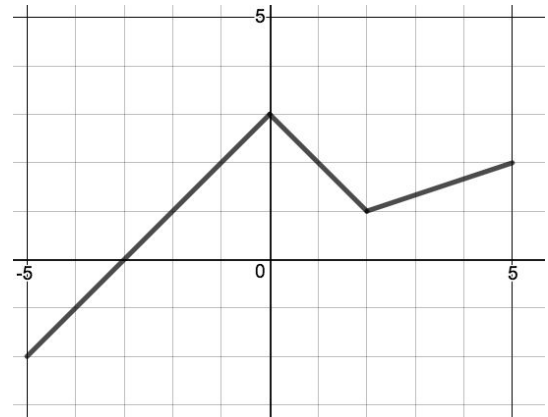
Math SL PROBLEM SET 79

Section A (Skills/Concepts Consolidation)

1. **(F2.3; C6.1, 6.5 - R) (CI)** Given the graph of the function f :

(Cirrito 6.1, 6.2; p167,177)

- $h(x)$ is defined as $h(x) = 2f(x) + 1$. Sketch $h(x)$.
- $k(x)$ is defined as $k(x) = f[2(x - 1)]$. Sketch $k(x)$.
- $m(x)$ is defined as $m(x) = f(-\frac{1}{2}x) + 3$. Sketch $m(x)$.
- Determine the value of $f'(1)$ and $\frac{d}{dx}f(3)$.
- Evaluate $\int_{-5}^5 f(x)dx$.



2. **(T3.4; C6.1, C6.5 - R) (CI)** When a person is at rest, the blood pressure, P mm of mercury, at any time t seconds can be modeled by the equation $P(t) = -20 \cos\left(\frac{5\pi}{3}t\right) + 100$, $t \geq 0$.

(Cirrito 10.5, p361)

- Determine the amplitude and period of P .
- What is the maximum blood pressure reading that can be recorded for this person?
- Sketch the graph of P showing two full cycles.
- Find the first three times when the pressure reaches a reading of 110 mm.
- Find the slope of the line that is tangent to $P(t)$ at $t = 0.5$.
- Find $\int P(t) dt$.

3. **(F2.4 - R) (CA)** A quadratic function is defined by the equation $Q(x) = -2x^2 - 12x - 22$.

(Cirrito 2.4, p39)

- (CI)** WITHOUT using a calculator, predict the number of x -intercepts of this function.
- Rewrite the equation in the form of $Q(x) = a(x - h)^2 + k$. Show/explain your working.
- Find the function $g(x)$ that is a result of applying the following two transformations on the graph of $Q(x)$: a reflection about the x -axis followed by a vertical translation of 4 units in the positive direction. Express $g(x)$ in the form of $g(x) = ax^2 + bx + c$.
- Find the function $h(x)$ that is a result of applying the following two transformations on the graph of $Q(x)$: a vertical translation of 4 units in the positive direction followed by a reflection about the x -axis. Express $h(x)$ in the form of $g(x) = ax^2 + bx - c$.
- Why are the functions $g(x)$ and $h(x)$ different? What does this say about the relationship between the transformations of a reflection about the x -axis and a vertical translation?

Math SL PROBLEM SET 79

4. **(A1.1 - R) (CA)** Find the sum of the first 50 terms of an arithmetic sequence, given that the 15th term is 34 and the sum of the first 8 terms is 20. **(Cirrito 8.2.4, p264)**

Section B (Skills/Concepts Practice)

5. **(A1.1 - R) (CI) SKILL:** Sigma Notation. Write the following expressions as a sum of terms and then evaluate each sum.

a. $\sum_{i=1}^6 (2i + 3)$ b. $\sum_{i=4}^9 (3 \times 2^{7-i})$ c. $\sum_{i=3}^7 (i^2 - 3)$ d. $\sum_{i=2}^7 (\ln(e^{i+1}))$

6. **(A1.1 - R) (CA) SKILL:** Sigma Notation. Given that $u_i = -3 + 4i$ and that $v_i = 12 - 3i$, write the following expressions as a sum of terms and then evaluate each sum.

a. $\sum_{i=1}^{10} (u_i + v_i)$ b. $\sum_{i=1}^{10} (3u_i + 4v_i)$ c. $\sum_{i=1}^{10} u_i v_i$

7. **(A1.2 - R) (CI) SKILL:** Laws of Exponents. Simplify the following, leaving your final answer using only positive exponents.

a. $\frac{(-3^4) \times (3^{-2})}{(-3)^{-2}}$ b. $\frac{9y^2 (-x^{-1})^{-2}}{(-2y^2)^3 (x^{-2})^3}$ c. $\frac{x^{-1} - y^{-1}}{x^{-1} y^{-1}}$ d. $\frac{x^{-2} + 2x^{-1}}{x^{-1} + x^{-2}}$

8. **(A1.2 - R) (CI) SKILL:** Laws of Logs. Simplify the following (Express as single logs)

a. $\log_3(2x) + \log_3 w$ b. $\log_4 x - \log_4(7y)$ c. $2\log_a x + 3\log_a(x + 1)$
d. $5\log_a x - \frac{1}{2}\log_a(2x - 3) + 3\log_a(x + 1)$

9. **(A1.3 - R) (CI) SKILL:** Binomial Expansion. Expand the following expressions:

a. $(2 + x)^4$ b. $(3x + 2y)^4$ c. $(x - 3y)^5$ d. $(2p + \frac{4}{p})^3$

Section C (Skills/Concepts HW)

10. Sigma Notation: Oxford Exercise 6F, p171, Q2,3
11. Laws of Exponents: Oxford, Exercise 4C, p107, Q1,2
12. Laws of Logarithms: Oxford, Exercise 4M, p124, Q2,3
13. Binomial Expansion: Oxford, Exercise 6N, p187, Q1,2,3,4