

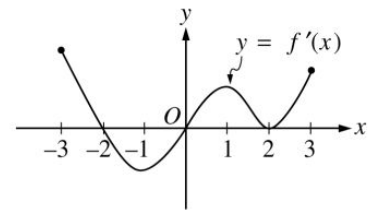
Math SL PROBLEM SET 88

Section A (Skills/Concepts Consolidation)

1. **(CA6.5) (CI)** The figure above shows the graph of f' , the derivative of a function f . The domain of the function f is the set of all x such that $-3 \leq x \leq 3$.

(Oxford 9H, p308)

- For what values of $-3 \leq x \leq 3$, does f have a relative maximum? A relative minimum? Justify your answer.
- For what values of x is the graph of f concave up? Justify your answer.
- Use the information found in parts (a) and (b) and the fact that $f(-3) = 0$ to sketch a possible graph of f on $-3 \leq x \leq 3$.

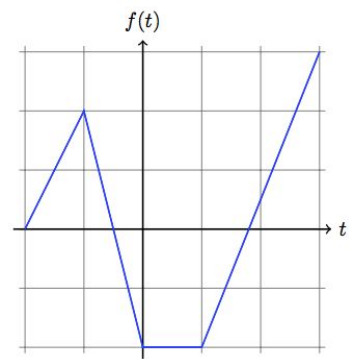


Note: This is the graph of the derivative of f , not the graph of f .

2. **(CA6.5) (CI)** Let $g(x) = \int_{-2}^x f(t) dt$ where f is the function whose graph is shown on the right.

(Oxford 9H, p308)

- Evaluate $g(1)$, $g(0)$, $g(1)$, $g(2)$, and $g(3)$.
- On what interval is g increasing? Why?
- Where does g have a maximum value? Why?



3. **(T3.5) (CI)** Solve the following equations on the domain of $0 \leq x \leq 2\pi$.

(Cirrito 10.4, p351)

- $\cos(2x) + 3\sin(x) - 2 = 0$
- $2\sin^2(x) - 3\cos(x) = 0$

4. **(CA6.6) (CI)** A particle travels in a straight line with velocity (in m/s) at time t seconds given by $v(t) = 3 \cos(t)$.

(Cirrito 22.6, p764)

- Find the displacement of the particle for the time interval $t = 0$ to $t = \frac{3\pi}{4}$.
- Find the total distance traveled by the particle over the time interval $t = 0$ to $t = \frac{3\pi}{4}$.
- Find the acceleration of the particle at $t = \frac{\pi}{3}$ s.

5. **(CA6.4) (CI)** Evaluate each definite integral.

(Cirrito 22.5, p748)

- $\int_{-1}^3 (-x^3 + 3x^2 + 1) dx$
- $\int_{-4}^{-1} -\frac{4}{x^3} dx$
- $\int_{-1}^1 e^{2x-2} dx$

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Section B (Skills/Concepts Practice)

6. **(SP5.9) (CA)** The random variable X represents the annual consumption, in cubic metres, of water by households in the town of Hippersburg. X is normally distributed with mean μ and standard deviation σ . It is given that 30% of households use more than 200 cubic metres annually and 20% of households use less than 120 cubic metres annually. **(Cirrito 17.2, p557)**
- Find the value of μ and the value of σ .
 - Find $P(X > 190)$
7. **(SP5.9) (CI)** Let X be a random variable that is normally distributed with a mean of 100 seconds and a standard deviation of 10 seconds. **(Cirrito 17.2, p557)**
- On a diagram, shade the region representing $P(X > 90)$.
 - Given that $P(X < k) = P(X > 90)$, find the value of k .
 - Given that $P(X > 90) = 0.84$, find $P(90 < X < k)$.
8. **(SP5.8) (CA)** In the city of Centreville one person in five is left-handed. **(Cirrito 16.3, p548)**
- Find the probability that in a random sample of ten people from Centreville
 - exactly three will be left-handed,
 - more than half will be left-handed
 - Find the most likely number of left-handed people in a random sample of 12 people.
 - Find the mean and standard deviation of the number of left-handed people in a random sample of 25 people.
 - How large must a random sample be if the probability that it contains at least one left-handed person is to be greater than 0.95 ?
9. **(CA6.5) (CI)** Let $f(x) = x^3 - 3x^2$ on $[0, 4]$. **(Cirrito 22.5, p748)**
- Find the net area between f and the x -axis.
 - Find the total area enclosed by f and the x -axis.