

Math SL PROBLEM SET 82

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

(Cirrito 10.4, p359)

a. $\sin^2(2x) - \frac{1}{4} = 0$

b. $\tan^2(\frac{1}{2}x) - 3 = 0$

2. **(CA6.2 - R) (CI)** Given the following functions, find their derivatives:

(Cirrito 19.3, p618)

a. $f(x) = \ln(x^2 + 4x - 2)$

b. $g(x) = 3x\cos(5x^3)$

c. $h(x) = \frac{3x^4}{e^{4x}}$

3. **(CA6.4 - R) (CA)** Evaluate the following integrals:

(Oxford 9F, p302)

a. $\int_2^6 e^{\frac{x}{2}+2} dx$

b. $\int_e^{e^2} \frac{2}{3x} dx$

c. $\int_{\frac{3\pi}{4}}^{\pi} (1 - \sin(2x)) dx$

4. **(F2.6; C6.1, C6.5 - R) (CI)** Given the function $g(x) = 2e^{-x} - 1$,

(Cirrito 5.3.3, p131)

a. State the transformations that were applied to $y = e^x$.

b. Find the asymptote(s) and intercept(s) of g and sketch.

c. Find the equation of the inverse of $g(x)$ and sketch $g^{-1}(x)$.

d. Find the equation of the line that is tangent to $f(x)$ at $x = -\ln 2$.

e. Solve for a if $\int_0^a g(x) dx = \frac{-2}{e^2}$.

5. **(SP5.6 - R) (CI)** For events A and B , it is known that $P(A' \cap B') = 0.3$ and that $P(A) = 0.2$ and that $P(B) = 0.6$. Find:

(Cirrito 15.2, p510)

a. $P(A \cup B)$

b. $P(A | B)$

c. $P(B' | A')$

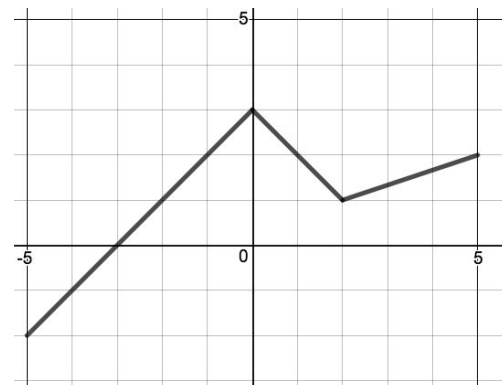
d. Are A and B independent events?

Math SL PROBLEM SET 82

6. **(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 $\int_{-5}^5 2f(x)dx$.



7. **(CA6.5 - E) (CI)** For the function $g(x) = \frac{\ln(x)}{x^2}$ where $x > 0$, determine (if they exist):

(Cirrito 20.2, p649)

- the x -intercept(s)
- How do you know that the function has a horizontal asymptote at $y = 0$?
- the coordinate(s) of the stationary point(s)
- the x -coordinate(s) of the inflection point(s)
- (CA)** Sketch the graph of $g(x)$.

8. **(CA6.5 - E) (CI)** For the function $h(x) = \sin^2(x) - \cos(x)$, $x \in [0, 2\pi]$, determine:

(Cirrito 20.2, p649)

- all extrema (and express as ordered pairs).
- Classify the extrema using the second derivative.
- Hence, determine the intervals of increase and decrease. (Sketch from your answers from Q(a) and Q(b) may help).
- (CA)** Evaluate and interpret the following:

i. $\int_0^{\pi} h(x)dx$

ii. $\int_0^{\pi} |h(x)| dx$