

1. Evaluate the following definite integrals.

$$(a) \int_{-1}^2 (2x - 3) dx$$

$$(b) \int_1^9 (t\sqrt{t} - 2) dt$$

$$(c) \int_1^2 \left(\frac{p-1}{p^3} \right) dp$$

$$(d) \int_1^3 2z^{-\frac{6}{5}} dz$$

$$(e) \int_1^3 \frac{y^5 - 2y}{y^3} dy$$

$$(f) \int_{\frac{\pi}{4}}^{\frac{3\pi}{4}} \sin(2x) \cos(2x) dx$$

$$(g) \int_{\frac{\pi}{2}}^{\frac{3\pi}{4}} \csc(\alpha) \cot(\alpha) d\alpha$$

$$(h) \int_{\frac{\pi}{9}}^{\frac{\pi}{5}} \sin(y^2) dy$$

$$(i) \int_0^{\pi} \tan \varphi \, d\varphi$$

$$(j) \int_0^3 \sec(2) \, dx$$

$$(k) \int_0^{\pi} \sin \theta \, d\theta$$

$$(l) \int_0^{\pi} \sin \theta \, dx$$

2. Find each of the following.

$$(a) \frac{d}{dx} \int_3^5 \sqrt{4t-1} \, dt$$

$$(b) \int_3^5 \frac{d}{dt} [\sqrt{4t-1}] \, dt$$

$$(c) \frac{d}{dx} \int_3^{5x^2} \sqrt{4t-1} \, dt$$

$$(d) \int_3^{5x^2} \frac{d}{dt} [\sqrt{4t-1}] \, dt$$

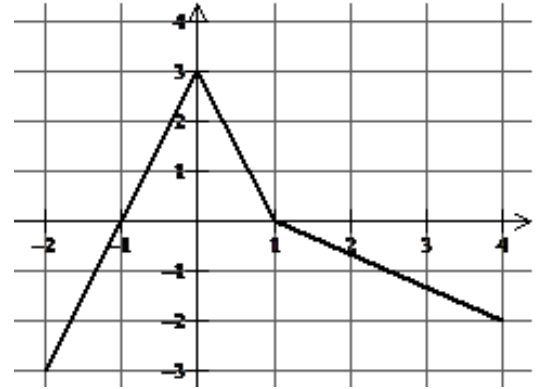
3. The graph of the function f , consisting of three line segments is given below.

Let g be the function defined by $g(x) = \int_1^x f(t) dt$.

(a) Find the value of each of the following, if possible.
Justify your answers.

(i) $g(1)$

(ii) $g(-2)$



(iii) $g(4)$

(iv) $g'(-1)$

(v) $g'(0)$

(vi) $g''(-1)$

(vii) $g''(0)$

(viii) $g''(2)$

(b) Find the absolute maximum value of g on $[-2, 4]$. Justify your answer.

(c) Find the x -coordinate of each point of inflection of the graph of g . Justify your answer.