

The Islamic University Of Gaza
Department of Mathematics
Calculus A (MathA1401)

Date: 3/1/2004

Final Exam

Time: 2 Hours

	Q.1	Q.2	Q.3	Q.4	Q.5	Q.6	Q.7	Total
	14	14	14	24	12	12	10	100

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Answer the following questions:

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Q.1) (a) Find $\frac{dy}{dx}$ if $y = \tan(3x - 2) + \sin^2 x$.

(b) Find $\frac{dy}{dx}$ if $y = \int_{2x}^{x^2} \frac{dt}{t^3 + 4}$.

Q.2) (a) Solve the inequality $|\frac{4}{x} - 2| < 1$

(b) Use the $\delta - \epsilon$ definition to show that $\lim_{x \rightarrow 2} (5 - 2x) = 1$.

Q.3) (a) Evaluate the integral $\int_1^2 \frac{x}{(x^2 + 2)^3} dx$

(b) Evaluate the integral $\int \frac{x}{\sqrt{2x+1}} dx$

Q.4) Let $f(x) = \frac{9x}{(x-1)^2}$

(a) Find the intervals on which $f(x)$ is increasing and decreasing.

(b) Find the intervals on which $f(x)$ is concave up and concave down.

(c) Find all the asymptotes of $f(x)$.

(d) Graph $y = f(x)$.

Q.5) Find the area of the region (see the figure below) bounded from above by the curve $y = \sqrt{x}$ and the line $y + x = 2$ and below by the curve $y = -\sqrt{x}$.

Q.6) Find the volume of the solid generated by revolving the region bounded by the curve $y = x^2 - 2$ and the line $y = 2$ about the line $y = 2$.

Q.7) Choose the correct answer for each of the following:

(a) If $|-x| = -x$, then

- (1) $x \geq 0$ (2) $x \leq 0$ (3) non of the above.

(b) If $f(x)$ is continuous on $[a, b]$, then

- (1) $f(x)$ is integrable over $[a, b]$. (2) $f(x)$ has absolute extreme values on $[a, b]$
(3) all of the above.

(c) If $f(x)$ is an odd function, then $g(x) = \frac{\sqrt[3]{x}}{\sin x - f(x)}$ is

- (1) even (2) odd (3) neither.

(d) The length, L , of the curve $y = \frac{1}{3}x^3$, $1 \leq x \leq 4$ is given by

- (1) $L = \int_1^4 \sqrt{1+x^2} dx$ (2) $L = 2\pi \int_1^4 \sqrt{1+x^4} dx$ (3) $L = \int_1^4 \sqrt{1+x^4} dx$

(e) If $f(x)$ is differentiable at $x = a$, then

- (1) $\lim_{x \rightarrow a} f(x) = f(a)$ (2) $\lim_{x \rightarrow a} f'(x) = f'(a)$ (3) $\lim_{x \rightarrow a} f'(x) = f(a)$