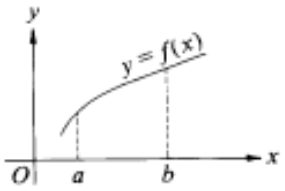
APAB S.Hogan

Ch.5 Review Sheet

Directions: The exam will consist of nine multiple-choice questions and two free-response questions on a variety of topics. All questions will be from released AP examinations. THIS REVIEW has 11 multiple-choice questions and 2 free-response questions (from released AP exams). **THIS IS A NON-CALCULATOR EXAM!!!** You will have 48 minutes for the exam.

Questions	Estimated Time
9 Multiple-Choice	18 minutes (2 minutes per question)
2 Free-Response	30 minutes (15 minutes per question)

1



If f is the continuous, strictly increasing function on the interval $a \le x \le b$ as shown above, which of the following must be true?

I. $\int_a^b f(x)\,dx < f(b)(b-a)$

II. $\int_a^b f(x)\,dx > f(a)(b-a)$

III. $\int_a^b f(x)\,dx = f(c)(b-a)$ **for some number c such that $a < c < b$**

(A) I only (B) II only (C) III only (D) I and III only (E) I, II, and III

2

The average value of $\sqrt{x}$ over the interval $0 \le x \le 2$ is

(A) $\frac{1}{3}\sqrt{2}$ (B) $\frac{1}{2}\sqrt{2}$ (C) $\frac{2}{3}\sqrt{2}$ (D) 1 (E) $\frac{4}{3}\sqrt{2}$

3

$\int_1^2 \frac{x^2-1}{x+1}\,dx =$

(A) $\frac{1}{2}$ (B) 1 (C) 2 (D) $\frac{5}{2}$ (E) $\ln 3$

4

$\int_0^8 \frac{dx}{\sqrt{1+x}} =$

(A) 1 (B) $\frac{3}{2}$ (C) 2 (D) 4 (E) 6

5

Which of the following is equal to $\int \frac{1}{\sqrt{25-x^2}}\,dx$?

(A) $\arcsin\frac{x}{5}+C$ (B) $\arcsin x+C$ (C) $\frac{1}{5}\arcsin\frac{x}{5}+C$

(D) $\sqrt{25-x^2}+C$ (E) $2\sqrt{25-x^2}+C$

6 If the substitution $\sqrt{x} = \sin y$ is made in the integrand of $\int_0^{1/2} \frac{\sqrt{x}}{\sqrt{1-x}}\,dx$, the resulting integral is

(A) $\int_0^{1/2} \sin^2 y\,dy$ (B) $2\int_0^{1/2} \frac{\sin^2 y}{\cos y}\,dy$ (C) $2\int_0^{\pi/4} \sin^2 y\,dy$

(D) $\int_0^{\pi/4} \sin^2 y\,dy$ (E) $2\int_0^{\pi/6} \sin^2 y\,dy$

7 The area of the region bounded by the lines $x = 0$, $x = 2$, and $y = 0$ and the curve $y = e^{x/2}$ is

(A) $\frac{e-1}{2}$ (B) $e-1$ (C) $2(e-1)$ (D) $2e-1$ (E) $2e$

8 The domain of the function defined by $f(x) = \ln(x^2 - 4)$ is the set of all real numbers x such that

(A) $|x| < 2$ (B) $|x| \le 2$ (C) $|x| > 2$ (D) $|x| \ge 2$ (E) x is a real number

9 For $0 < x < \frac{\pi}{2}$, if $y = (\sin x)^x$, then $\frac{dy}{dx}$ is

(A) $x\ln(\sin x)$ (B) $(\sin x)^x \cot x$ (C) $x(\sin x)^{x-1}(\cos x)$

(D) $(\sin x)^x (x\cos x + \sin x)$ (E) $(\sin x)^x (x\cot x + \ln(\sin x))$

10 The slope of the line tangent to the graph of $y = \ln\left(\frac{x}{2}\right)$ at $x = 4$ is

(A) $\frac{1}{8}$ (B) $\frac{1}{4}$ (C) $\frac{1}{2}$ (D) 1 (E) 4

11 If $y = \arctan(\cos x)$, then $\frac{dy}{dx} =$

(A) $\frac{-\sin x}{1+\cos^2 x}$ (B) $-(\operatorname{arcsec}(\cos x))^2 \sin x$ (C) $(\operatorname{arcsec}(\cos x))^2$

(D) $\frac{1}{(\arccos x)^2 + 1}$ (E) $\frac{1}{1+\cos^2 x}$

FR1 A particle starts at time $t = 0$ and moves along the x-axis so that its position at any time $t \ge 0$ is given by $x(t) = (t-1)^3(2t-3)$.

(a) Find the velocity of the particle at any time $t \ge 0$.

(b) For what values of t is the velocity of the particle less than zero?

(c) Find the value of t when the particle is moving and the acceleration is zero.

FR2	A particle moves on the x-axis so that its velocity at any time $t \geq 0$ is given by $v(t) = 12t^2 - 36t + 15$. At $t = 1$, the particle is at the origin. (a) Find the position $x(t)$ of the particle at any time $t \geq 0$. (b) Find all values of t for which the particle is at rest. (c) Find the maximum velocity of the particle for $0 \leq t \leq 2$. (d) Find the total distance traveled by the particle from $t = 0$ to $t = 2$.