APAB S.Hogan

Chapter 4 Review

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.

EXAM BREAKDOWN:

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

1 $\int \left(x^3 - 3x\right) dx =$

(A) $3x^2 - 3 + C$ (B) $4x^4 - 6x^2 + C$ (C) $\frac{x^4}{3} - 3x^2 + C$

(D) $\frac{x^4}{4} - 3x + C$ (E) $\frac{x^4}{4} - \frac{3x^2}{2} + C$

2 If $p(x) = (x+2)(x+k)$ and if the remainder is 12 when $p(x)$ is divided by $x-1$, then $k =$

(A) 2 (B) 3 (C) 6 (D) 11 (E) 13

3 $\int_0^8 \frac{dx}{\sqrt{1+x}} =$

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

4 If $\frac{dy}{dx} = \tan x$, then $y =$

(A) $\frac{1}{2}\tan^2 x + C$ (B) $\sec^2 x + C$ (C) $\ln\left|\sec x\right| + C$

(D) $\ln\left|\cos x\right| + C$ (E) $\sec x \tan x + C$

5 $\int_0^{1/2} \frac{2x}{\sqrt{1-x^2}} dx =$

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

6 What is the average (mean) value of $3t^3 - t^2$ over the interval $-1 \le t \le 2$?

(A) $\frac{11}{4}$ (B) $\frac{7}{2}$ (C) 8 (D) $\frac{33}{4}$ (E) 16

7 $\int \frac{x^2}{e^{x^3}}\,dx =$

(A) $-\frac{1}{3}\ln e^{x^3} + C$ (B) $-\frac{e^{x^3}}{3} + C$ (C) $-\frac{1}{3e^{x^3}} + C$

(D) $\frac{1}{3}\ln e^{x^3} + C$ (E) $\frac{x^3}{3e^{x^3}} + C$

8 If $\frac{d}{dx}(f(x)) = g(x)$ and $\frac{d}{dx}(g(x)) = f(x^2)$, then $\frac{d^2}{dx^2}\left(f(x^3)\right) =$

(A) $f\left(x^6\right)$ (B) $g\left(x^3\right)$ (C) $3x^2 g\left(x^3\right)$

(D) $9x^4 f\left(x^6\right) + 6x\, g\left(x^3\right)$ (E) $f\left(x^6\right) + g\left(x^3\right)$

9 If $f(x) = \int_0^x \frac{1}{\sqrt{t^3+2}}\,dt$, which of the following is FALSE?

(A) $f(0) = 0$

(B) f is continuous at x for all $x \ge 0$.

(C) $f(1) > 0$

(D) $f'(1) = \frac{1}{\sqrt{3}}$

(E) $f(-1) > 0$

10 For what non-negative value of b is the line given by $y = -\frac{1}{3}x + b$ normal to the curve $y = x^3$?

(A) 0 (B) 1 (C) $\frac{4}{3}$ (D) $\frac{10}{3}$ (E) $\frac{10\sqrt{3}}{3}$

11 $\int_{-1}^{2} \frac{|x|}{x}\,dx$ is

(A) −3 (B) 1 (C) 2 (D) 3 (E) nonexistent

1	A particle moves along the x-axis in such a way that its acceleration at time t for $t \geq 0$ is given by $a(t) = 4\cos(2t)$. At time $t = 0$, the velocity of the particle is $v(0) = 1$ and its position is $x(0) = 0$. (a) Write an equation for the velocity $v(t)$ of the particle. (b) Write an equation for the position $x(t)$ of the particle. (c) For what values of t, $0 \leq t \leq \pi$, is the particle at rest?
2	Let f be a function such that $f''(x) = 6x + 8$. (a) Find $f(x)$ if the graph of f is tangent to the line $3x - y = 2$ at the point $(0, -2)$. (b) Find the average value of $f(x)$ on the closed interval $[-1, 1]$.
