Chapter 8 Practice AP Questions

Name: _____

1) $\int \frac{dx}{2x^2+3x+1} =$

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

(D) $\ln\left|\frac{2x+1}{x+1}\right|+C$ (E) $\ln\left|(x+1)(2x+1)\right|+C$

2) $\int_1^4 \frac{t-2}{(t+1)(t-4)}\,dt$ is found by using which of the limits below?

(A) $\lim_{x\to 2}\int_x^4 \frac{t-2}{(t+1)(t-4)}\,dt$ (B) $\lim_{x\to 1^+}\int_x^4 \frac{t-2}{(t+1)(t-4)}\,dt$ (C) $\lim_{x\to 4^-}\int_x^4 \frac{t-2}{(t+1)(t-4)}\,dt$

(D) $\lim_{x\to 1}\int_x^4 \frac{t-2}{(t+1)(t-4)}\,dt$ (E) $\lim_{x\to 4^-}\int_1^x \frac{t-2}{(t+1)(t-4)}\,dt$

3) In decomposing $\frac{5x-2}{(x-7)(x+4)}$ by the method of partial fractions, one of the fractions obtained is

(A) $\frac{-2}{(x-7)}$ (B) $\frac{2}{(x-7)}$ (C) $\frac{3}{(x-7)}$ (D) $\frac{3}{(x+4)}$ (E) $\frac{5}{(x+4)}$

4) Which of the following improper integrals converges?

I. $\int_0^\infty e^{-x}dx$

II. $\int_0^1 \frac{1}{x^2}dx$

III. $\int_0^1 \frac{1}{\sqrt{x}}dx$

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

5) $\int_1^{\infty} x^{\frac{-5}{4}}\,dx$ is

(A) $\frac{5}{4}$ (B) $\frac{1}{4}$ (C) 4 (D) -4 (E) nonexistent

6) Let f be the function defined for $x > 0$, with $f(e) = 2$ and f', the first derivative of f, given by $f'(x) = x^2 \ln x$.

(a) Write an equation for the line tangent to the graph of f at the point $(e, 2)$.

(b) Is the graph of f concave up or concave down on the interval $1 < x < 3$? Give a reason for your answer.

(c) Use antidifferentiation to find $f(x)$.

7) Consider the differential equation $\frac{dy}{dx} = x^2 - \frac{1}{2}y$.

(a) Find $\frac{d^2y}{dx^2}$ in terms of x and y.

(b) Let $y = f(x)$ be the particular solution to the given differential equation whose graph passes through the point $(-2, 8)$. Does the graph of f have a relative minimum, a relative maximum, or neither at the point $(-2, 8)$? Justify your answer.

(c) Let $y = g(x)$ be the particular solution to the given differential equation with $g(-1) = 2$. Find $\lim_{x \to -1} \left(\frac{g(x) - 2}{3(x+1)^2} \right)$. Show the work that leads to your answer.

(d) Let $y = h(x)$ be the particular solution to the given differential equation with $h(0) = 2$. Use Euler's method, starting at $x = 0$ with two steps of equal size, to approximate $h(1)$.