AP Calculus AB                                                    Name:_____

**Review 2**, No Calculator

Complete all the following on notebook paper.

_____ 1.

The point <u>on the curve</u> $x^2 + 2y = 0$ that is nearest the point $\left(0, -\dfrac{1}{2}\right)$ occurs where $y$ is

(A) $\dfrac{1}{2}$       (B) 0       (C) $-\dfrac{1}{2}$       (D) $-1$       (E) none of the above

_____ 2.

If $f(x) = \dfrac{4}{x-1}$ and $g(x) = 2x$, then the solution set of $f(g(x)) = g(f(x))$ is

(A) $\left\{\dfrac{1}{3}\right\}$       (B) $\{2\}$       (C) $\{3\}$       (D) $\{-1, 2\}$       (E) $\left\{\dfrac{1}{3}, 2\right\}$

_____ 3.

The region bounded by the $x$-axis and the part of the graph of $y = \cos x$ between $x = -\dfrac{\pi}{2}$ and

$x = \dfrac{\pi}{2}$ is separated into two regions by the line $x = k$. If the area of the region for $-\dfrac{\pi}{2} \le x \le k$ is

three times the area of the region for $k \le x \le \dfrac{\pi}{2}$, then $k =$

(A) $\arcsin\left(\dfrac{1}{4}\right)$       (B) $\arcsin\left(\dfrac{1}{3}\right)$       (C) $\dfrac{\pi}{6}$

(D) $\dfrac{\pi}{4}$       (E) $\dfrac{\pi}{3}$

_____ 4.

If the function $f$ is defined by $f(x) = x^5 - 1$, then $f^{-1}$, the inverse function of $f$, is defined by $f^{-1}(x) =$

(A) $\dfrac{1}{\sqrt[5]{x+1}}$       (B) $\dfrac{1}{\sqrt[5]{x+1}}$       (C) $\sqrt[5]{x-1}$
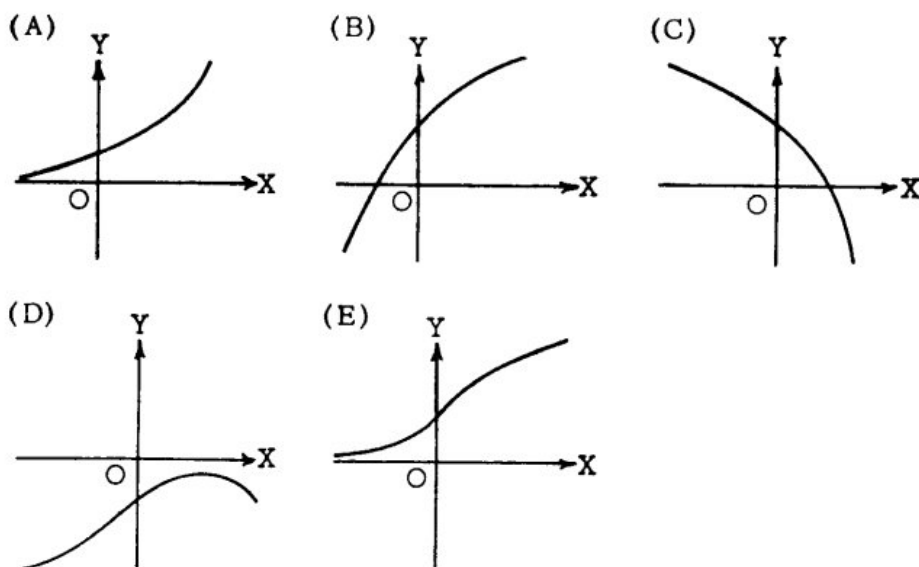
(D) $\sqrt[5]{x} - 1$       (E) $\sqrt[5]{x+1}$

_____ 5.

If $f'(x)$ and $g'(x)$ exist and $f'(x) > g'(x)$ for all real $x$, then the graph of $y = f(x)$ and the graph of $y = g(x)$

(A) intersect exactly once.

(B) intersect no more than once.

(C) do not intersect.

(D) could intersect more than once.

(E) have a common tangent at each point of intersection.

_____ 6.

If $y$ is a function of $x$ such that $y' > 0$ for all $x$ and $y'' < 0$ for all $x$, which of the following could be part of the graph of $y = f(x)$?



_____ 7.

The graph of $y = 5x^4 - x^5$ has a point of inflection at

(A) $(0,0)$ only

(B) $(3,162)$ only

(C) $(4,256)$ only

(D) $(0,0)$ and $(3,162)$

(E) $(0,0)$ and $(4,256)$

_____ 8.

If $f(x) = 2 + |x - 3|$ for all $x$, then the value of the derivative $f'(x)$ at $x = 3$ is

(A)  $-1$       (B)  0       (C)  1       (D)  2       (E)  nonexistent

_____ 9.

A point moves on the $x$-axis in such a way that its velocity at time $t$ $(t>0)$ is given by $v = \dfrac{\ln t}{t}$.

At what value of $t$ does $v$ attain its maximum?

(A)  1          (B)  $e^{\frac{1}{2}}$          (C)  $e$          (D)  $e^{\frac{3}{2}}$

(E)   There is no maximum value for $v$.

_____ 10.

An equation for a tangent to the graph of $y = \arcsin \dfrac{x}{2}$ at the origin is

(A)  $x - 2y = 0$     (B)  $x - y = 0$     (C)  $x = 0$     (D)  $y = 0$     (E)  $\pi x - 2y = 0$

11. 2000—AB6

Consider the differential equation $\dfrac{dy}{dx} = \dfrac{3x^2}{e^{2y}}$ .

(a)  Find a solution $y = f(x)$ to the differential equation satisfying $f(0) = \dfrac{1}{2}$ .

(b)  Find the domain and range of the function $f$ found in part (a).

12. 2001—AB4

Let $h$ be a function defined for all $x \neq 0$ such that $h(4) = -3$ and the derivative of $h$ is given by

$h'(x) = \dfrac{x^2 - 2}{x}$ for all $x \neq 0$.

(a) Find all values of $x$ for which the graph of $h$ has a horizontal tangent, and determine whether $h$ has a local maximum, a local minimum, or neither at each of these values. Justify your answers.

(b) On what intervals, if any, is the graph of $h$ concave up? Justify your answer.

(c) Write an equation for the line tangent to the graph of $h$ at $x = 4$.

(d) Does the line tangent to the graph of $h$ at $x = 4$ lie above or below the graph of $h$ for $x > 4$ ? Why?