Name: Solution key Date: _____ Period: _____

AP MC Take Home Quiz (Calculator) - #1

(1) Unless otherwise specified, the domain of a function f is assumed to be the set of all real numbers x for which $f(x)$ is a real number.

(2) The inverse of a trigonometric function f may be indicated using the inverse function notation f^{-1} or with the prefix "arc" (e.g., $\sin^{-1} x = \arcsin x$).

SHOW ALL WORK. You may complete on this paper or a separate piece of paper. You may work together with others to understand how to find the solutions, but all submitted work must be your own.

A.

1. $\int xe^{x^2}dx =$

(A) $\frac{1}{2}e^{x^2}+C$ (B) $e^{x^2}+C$ (C) $xe^{x^2}+C$ (D) $\frac{1}{2}e^{2x}+C$ (E) $e^{2x}+C$

$\int e^u du = e^u$

$u = x^2$

$du = 2x\,dx$

$\frac{1}{2}\int 2xe^{x^2}dx = \frac{1}{2}\int e^u du$

$= \frac{1}{2}e^{x^2}+C$

D

2. Given that $y(1) = -3$ and $\frac{dy}{dx} = 2x + y$, what is the approximation for $y(2)$ if Euler's method is used with a step size of 0.5, starting at $x = 1$?

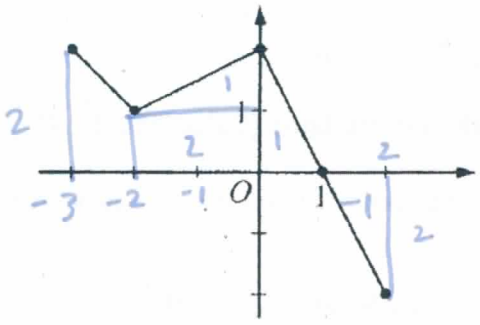
(A) -5 (B) -4.25 (C) -4 (D) -3.75 (E) -3.5

$\frac{dy}{dx} = 2x+y \quad y(1) = -3 \quad y(2) = ?$

n	0	1	2
x_n	1	1.5	2.0
y_n	-3	-3.5	-3.75

$y_1 = -3 + (0.5)(2(1)+(-3)) = -3 + -\frac{1}{2} = -3.5$

$y_2 = -3.5 + (0.5)(2(1.5)+(-2.5)) = -3.5 + (-0.25) = -3.75$



Graph of f

D

3. The graph of the piecewise linear function f is shown in the figure above. If $g(x) = \int_{-2}^{x} f(t)dt$, which of the following values is greatest?

(A) $g(-3)$ (B) $g(-2)$ (C) $g(0)$ (D) $g(1)$ (E) $g(2)$

$\int_{-2}^{-3} f(t)dt = -1.5$

$\int_{-2}^{-2} f(t)dt = 0$

$\int_{-2}^{0} f(t)dt = 3$

$\int_{-2}^{1} f(t)dt = 4$

$\int_{-2}^{2} f(t) = 3$

B

4. In the xy-plane, what is the slope of the line tangent to the graph of $x^2 + xy + y^2 = 7$ at the point $(2, 1)$?

(A) $-\frac{4}{3}$ (B) $-\frac{5}{4}$ (C) -1 (D) $-\frac{4}{5}$ (E) $-\frac{3}{4}$

$2x + (x)\left(\frac{dy}{dx}\right) + (1)(y) + 2y\frac{dy}{dx} = 0$

$\frac{dy}{dx}(x+2y) = -2x-y$

$\frac{dy}{dx} = \frac{-2x-y}{x+2y}$

@ $(2,1)$ $\frac{dy}{dx} = \frac{-2(2)-1}{2+2(1)} = \frac{-5}{4}$