AP Calculus AB 2020 Mock AP Exam #4

1) 25 minutes (15 points)

The function g has derivative g' where g' is dereasing and twice-differentiable. Selected values of g' are given in the table. It is given that g(1) = 2

x	1	3	4	10
g'(x)	9	7	5	0
g''(x)	4	1	2	6

a) What can we conclude using mean value theorem in the interval [1, 10]

b) Use left Riemann Sum with 3 subintervals indicated in table to approximate $\int_{1}^{10} g'(x)dx$

Is this an over or underapproximation of $\int_{1}^{10} g'(x)dx$? Provide support for your answer.

c) Evaluate $\int_{-1}^{-3} g''(1-3x)dx$. Show the work that leads to your answer.

d) Evaluate $\lim_{x \to 1} \frac{2e^{(9-g'(x))} - 2}{g'(4x) - 5}$ Show work to support your answer.

e) The function w is defined by $w(x) = 3x^2(g'(2x))$. Find $w'(2)$.

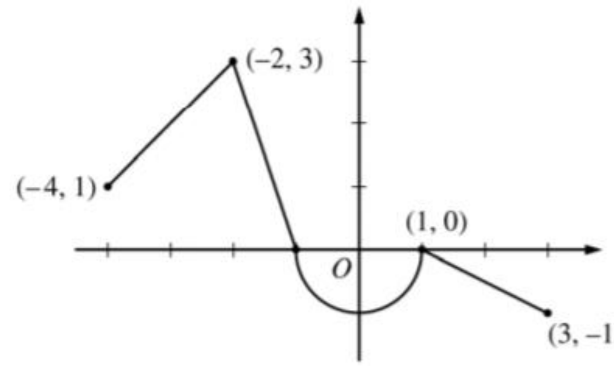
f) Given the differential equation $y' = (1-2y)g''(x)$. Let $y = k(x)$ be the particular solution with initial condition of $k(1) = 0$. Then use expression to find $k(3)$

2. 15 minutes (9 points)

The function f is continuous on the closed interval [-4,3].

The graph of f consists of 3 line segments and semicircle.

H(x) is defined as $H(x) = \int_{-1}^{x} f(t)dt$



Graph of f

a) Find the x-coordinate of each point of inflection for graph of H(x). Justify your answer.
b) Find the maximum value of H on the closed interval [-4, 3]. Justify your answer.
c) Find H''(2). Justify your answer.
d) Let p(x) be defined below: Is p continuous at x = 1? Show work leading to your answer.

$$p(x) = \begin{cases} f(x) + 1 & for\ x \leq 1 \\ f(x+2) - f(x) & for\ x > 1 \end{cases}$$

e) For $-4 \leq t \leq 3$, a particle moves along the x-axis. The velocity v of the particle is represented by equation v(t) = f(t). Find the acceleration of the particle at $t = \frac{5}{2}$. Is the velocity of the particle increasing, decreasing, or neither. Justify your answer.