Test A: Chapter 5

Name________________________________

Solve the problem.

1) Suppose that h is continuous and that $\int_{-2}^{4} h(x)\,dx = 2$ and $\int_{4}^{8} h(x)\,dx = -8$. Find $\int_{-2}^{8} h(x)\,dx$ and $\int_{8}^{-2} h(x)\,dx$

2) Suppose that g is continuous and that $\int_{4}^{7} g(x)\,dx = 9$ and $\int_{4}^{9} g(x)\,dx = 14$.

Find $\int_{9}^{7} g(x)\,dx$ and Find $\int_{4}^{4} f(x)\,dx$.

3) Suppose that f and g are continuous and that $\int_{7}^{11} f(x)\,dx = -2$ and $\int_{7}^{11} g(x)\,dx = 9$.

Find $\int_{7}^{11} [5f(x) + g(x)]\,dx$.

Find the average value over the given interval. SHOW ALL WORK.

4) $y = \frac{1}{x}$; [1, e]

Find dy/dx.

5) If $y = \int_{x^4}^{1} 12t^5 \, dt$ find dy/dx

6) $y = \int_{\cos x}^{\sin x} \frac{1}{9 - t^2} \, dt$ find dy/dx

7) If $\int_{1}^{3} f(x)dx = 10$, find $\int_{1}^{3} (f(x) + 5) \, dx$

Evaluate the definite integral using areas or antiderivatives. SHOW ALL WORK.

8) $\int_{-1}^{6} 6 \, dx$

9) $\int_{1}^{2} (2x^3 - 6x^{-2}) \, dx$

Evaluate the integral. <u>SHOW ALL WORK.</u>

10) $\displaystyle\int_0^{\pi/2} 17 \sin x \, dx$

11) $\displaystyle\int_0^{1} (x^4 - x^{\frac{1}{5}})dx$

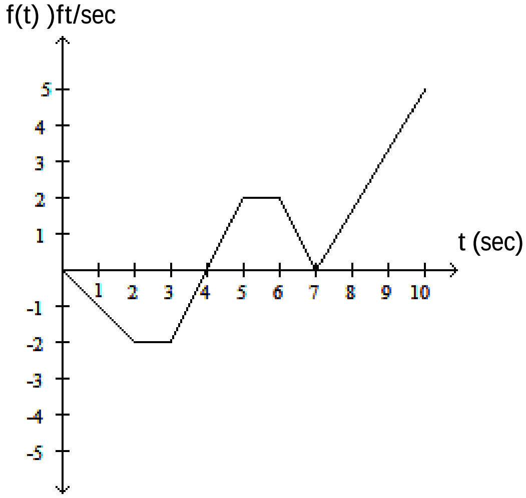
12) $\displaystyle\int_{\pi/4}^{3\pi/4} 8 \sec \theta \tan \theta \, d\theta$

13) $\displaystyle\int_1^{2} (2e^x - 8x^{-2}) \, dx$

14) $\displaystyle\int_1^{2} \frac{1-x}{x^2} \, dx$

15) The graph of the function, f, is given below with position defined as follows.

$$g = \int_0^t f(x)\,dx$$



a) Determine the relative minimum of g. Justify your answer.

b) Find the absolute maximum of g on the interval [0, 10]? Justify your answer.

c) Determine when g is concave down on the interval [0, 10]? Justify your answers.

d) Determine the intervals where g is increasing. Justify your answer.

e) Write the equation of the tangent line of g at t =10.

Solve the problem.

16) Use the data below to approximate the area under the curve using Midpoint Riemann Sums with 3 sub-intervals.

T	0	2	4	6	8	10	12
P(t)	0	46	53	57	60	62	63

17) Let f be a function that is twice differentiable for all real numbers. The table gives values of f for s points in the closed interval $2 \leq x \leq 13$

x	2	3	5	8	13
f(x)	1	4	-2	3	6

Use a trapezoid approximation to find $\int_{2}^{13} f(x)$

18)

t (minutes)	0	12	20	24	40
$v(t)$ (meters per minute)	0	200	240	-220	150

Johanna jogs along a straight path. For $0 \le t \le 40$, Johanna's velocity is given by a differential function v. Selected values of v(t), where t is measured in minutes and v(t) is measured in meters per minute, are given in the table above.

A) Use the data in the table to estimate the value of $v'(22)$

B) Approximate the value of $\frac{1}{40}\int_0^{40} v(t)\,dt$ using a right Riemann sum with four sub-intervals indicated in the table. Using correct units, explain the meaning of the definite integral $\frac{1}{40}\int_0^{40} v(t)\,dt$ in the context of the problem.

C) Bob is riding his bicycle along the same path. For $0 \le t \le 10$. Bob's velocity is modeled by $B(t) = t^3 - 6t^2 + 300$, where t is measured in minutes and B(t) is measured in meters per minute. Find Bob's acceleration at time t = 4.

D) Based on the model B from part (c), find Bob's average velocity during the interval $0 \le t \le 5$.

Determine the intervals of Increase and Decrease. Then use this information to determine any Local Extrema. Justify your explanation

19) $f(x) = x^3 - 3x^2 - 9x + 3$

At the given point, find the equation of the line that is tangent to the curve.

20) $x^2 + y^2 - 2x + 4y = 8$, tangent at $(2, 4)$

21) Find dy/dx when

$$y = \frac{\sin(7x)}{5x}$$