AP Calculus **Name:**
Review #5

1. Let f be twice differentiable for all real numbers.

a. What does this information tell you about f? Circle the answer(s) that apply.

f exists f is differentiable f is continuous

b. What does this information tell you about f'? Circle the answer(s) that apply.

f' exists f' is differentiable f' is continuous

c. What does this information tell you about f''? Circle the answer(s) that apply.

f'' exists f'' is differentiable f'' is continuous

d. Let $f(2)=0$ and $f(6)=12$. What theorem allows you to conclude that there exists a c in the interval $(2,6)$ such that $f(c)=8$?

The Intermediate Value Theorem

e. Let $f(2)=0$ and $f(6)=12$. What theorem allows you to conclude that there exists a c in the interval $(2,6)$ such that $f'(c)=3$?

The Mean Value Theorem

2. Let $B(t)$ be a differentiable function given at select values in the table.

t	0	3	5	15
$B(t)$	-2	4	0	6

a. Estimate $B'(4)$.

$$\frac{0-4}{5-3} = \frac{-4}{2} = -2$$

b. What can you say about $B(10)$?

I. $B(10)>0$
II. $B'(10)>0$
III. $B''(10)>0$

I only II only III only I, II, and III None of the choices

3. If $f(3)=5$ and $f'(3)=4$ and $g(x)=f^{-1}(x)$, then

A. $g'(3)=\frac{1}{4}$ B. $g'(5)=\frac{1}{4}$ C. $g'(4)=\frac{1}{5}$ D. $g'(5)=\frac{1}{3}$

Remember, horizontal shifts produce equivalent integrals!

4. Write the following limits as integrals.

a. $$\lim_{n\to\infty}\frac{1}{n}\left[\sqrt{\frac{1}{n}}+\sqrt{\frac{2}{n}}+\ldots+\sqrt{\frac{n}{n}}\right] = \int_0^1 \sqrt{x}\,dx$$

b. $$\lim_{n\to\infty}\left(\frac{1}{n}\left(\left(9+\frac{1}{n}\right)^2+\left(9+\frac{2}{n}\right)^2+\left(9+\frac{3}{n}\right)^2+\left(9+\frac{4}{n}\right)^2+\ldots\ldots\ldots\ldots+\left(9+\frac{n}{n}\right)^2\right)\right) = \int_0^1 (9+x)^2\,dx$$

OR $\int_9^{10} x^2\,dx$

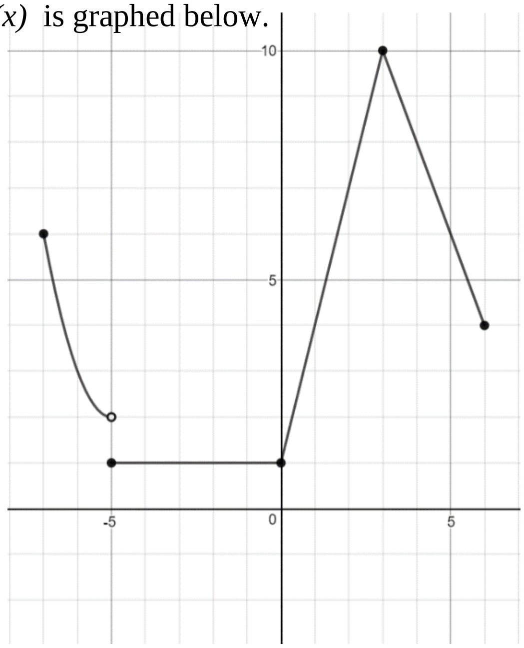
c. $$\lim_{n\to\infty}\left(\frac{3}{n}\left(\ln(2)+\ln\left(2+\frac{3}{n}\right)+\ln\left(2+\frac{6}{n}\right)+\ldots\ldots\ldots\ldots+\ln\left(2+\frac{3(n-1)}{n}\right)\right)\right) = \int_0^3 \ln(2+x)\,dx$$

OR $\int_2^5 \ln x\,dx$

d. $$\lim_{n\to\infty}\left(\frac{7}{n}\left(\sqrt[3]{-2+\frac{7}{n}}+\sqrt[3]{-2+\frac{14}{n}}+\sqrt[3]{-2+\frac{21}{n}}+\sqrt[3]{-2+\frac{28}{n}}+\ldots\ldots\ldots\ldots+\sqrt[3]{-2+\frac{7n}{n}}\right)\right) = \int_0^7 (-2+x)^{1/3}\,dx$$

OR $\int_{-2}^5 x^{1/3}\,dx$

5. *f(x)* is graphed below.



f(x) is … (circle all that apply)

I. continuous everywhere in the interval [-7, 6].

II. differentiable everywhere in the interval [-7, 6].

III. continuous, but not differentiable at $x = 0$.

IV. continuous and differentiable at $x = 2$.

V. not continuous and not differentiable at $x = -5$.