NOT Consumable

BC Review Wk 15 Block DO NOT WRITE ON THIS SHEET Show all work on another sheet

1. If $f(x)=(\ln x)^2$, then $f''(\sqrt{e})=$

A) $\frac{1}{e}$ B) $\frac{2}{e}$ C) $\frac{1}{2\sqrt{e}}$ D) $\frac{1}{\sqrt{e}}$ E) $\frac{2}{\sqrt{e}}$

2. What are all the values of x for which the series $\sum_{n=1}^{\infty}\left(\frac{2}{x^2+1}\right)^n$ converges?

A) $-1<x<1$ B) $x>1$ only C) $x\geq 1$ only
D) $x<-1$ and $x>1$ only E) $x\leq -1$ and $x\geq 1$

3. Let h be a differentiable function, and let *f* be the function defined by $f(x)=h(x^2-3)$. Which of the following is equal to *f'(2)*?

A) $h'(1)$ B) $4h'(1)$ C) $4h'(2)$ D) $h'(4)$ E) $4h'(4)$

4. In the xy-plane, the line x+y=k, where k is a constant, is tangent to the graph of $y=x^2+3x+1$ What is the value of k?

A) -3 B) -2 C) -1 D) 0 E) 1

5. $\int\frac{7x}{(2x-3)(x+2)}dx=$

A) $\frac{3}{2}\ln|2x-3|+2\ln|x+2|+C$ B) $3\ln|2x-3|+2\ln|x+2|+C$

C) $3\ln|2x-3|-2\ln|x+2|+C$ D) $-\frac{6}{(2x-3)^2}-\frac{2}{(x+2)^2}+C$ E) $-\frac{3}{(2x-3)^2}-\frac{2}{(x+2)^2}+C$

6. What is the sum of the series $1+\ln 2+\frac{(\ln 2)^2}{2!}+.....+\frac{(\ln 2)^n}{n!}+.....?$

A) $\ln 2$ B) $\ln(1+\ln 2)$ C) 2 D) e^2 E) The series diverges

x	0	1
f(x)	2	4
f'(x)	6	-3
g(x)	-4	3
G'(x)	2	-1

7. The table above gives values of *f*,*f'*,*g*,and *g'* for selected values of x. If $\int_0^1 f'(x)g(x)dx=5$, then

$\int_0^1 f(x)g'(x)dx=$

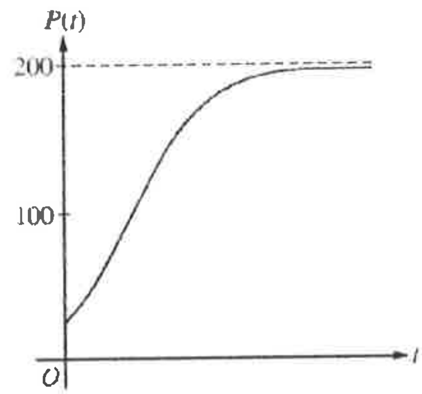
A) -14 B) -13 C) -2 D) 7 E) 15

8. If, $f(x) = x\sin(2x)$, which of the following is the Taylor series for f about x=0?

A) $x - \frac{x^3}{2!} + \frac{x^5}{4!} - \frac{x^7}{6!} + \dots$ B) $x - \frac{4x^3}{2!} + \frac{16x^5}{4!} - \frac{64x^7}{6!} + \dots$ C) $2x - \frac{8x^3}{3!} + \frac{32x^5}{5!} - \frac{128x^7}{7!} + \dots$

D) $2x^2 - \frac{2x^4}{3!} + \frac{2x^6}{5!} - \frac{2x^8}{7!} + \dots$ E) $2x^2 - \frac{8x^4}{3!} + \frac{32x^6}{5!} - \frac{128x^8}{7!} + \dots$

9. Which of the differential equations for a population P could model the logistic growth shown in the figure below



A) $\frac{dP}{dt} = 0.2P - 0.001P^2$ B) $\frac{dP}{dt} = 0.1P - 0.001P^2$ C) $\frac{dP}{dt} = 0.2P^2 - 0.001P$

D) $\frac{dP}{dt} = 0.1P^2 - 0.001P$ E) $\frac{dP}{dt} = 0.1P^2 + 0.001P$

10. In the xy-plane, a particle moves along the parabola $y = x^2 - x$ with a constant speed of $2\sqrt{10}$ units per second. If $\frac{dx}{dt} > 0$, what is the value of $\frac{dy}{dt}$ when the particle is at the point (2,2)?

A) $\frac{2}{3}$ B) $\frac{2\sqrt{10}}{3}$ C) 3 D) 6 E) $6\sqrt{10}$

NO Calculator

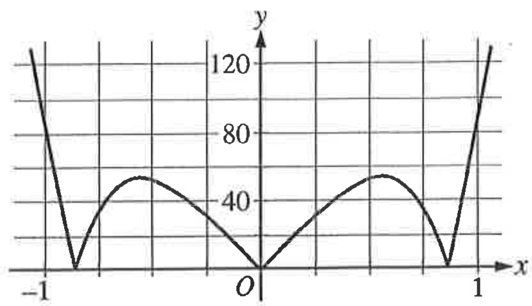
6. The function g has derivatives of all orders, and the Maclaurin series for g is

$$\sum_{n=0}^{\infty}(-1)^n \frac{x^{2n+1}}{2n+3} = \frac{x}{3} - \frac{x^3}{5} + \frac{x^5}{7} - \cdots.$$

(a) Using the ratio test, determine the interval of convergence of the Maclaurin series for g.

(b) The Maclaurin series for g evaluated at $x = \frac{1}{2}$ is an alternating series whose terms decrease in absolute value to 0. The approximation for $g\left(\frac{1}{2}\right)$ using the first two nonzero terms of this series is $\frac{17}{120}$. Show that this approximation differs from $g\left(\frac{1}{2}\right)$ by less than $\frac{1}{200}$.

(c) Write the first three nonzero terms and the general term of the Maclaurin series for $g'(x)$.



Graph of $y = \left|f^{(5)}(x)\right|$

6. Let $f(x) = \sin\left(x^2\right) + \cos x$. The graph of $y = \left|f^{(5)}(x)\right|$ is shown above.

(a) Write the first four nonzero terms of the Taylor series for $\sin x$ about $x = 0$, and write the first four nonzero terms of the Taylor series for $\sin\left(x^2\right)$ about $x = 0$.

(b) Write the first four nonzero terms of the Taylor series for $\cos x$ about $x = 0$. Use this series and the series for $\sin\left(x^2\right)$, found in part (a), to write the first four nonzero terms of the Taylor series for f about $x = 0$.

(c) Find the value of $f^{(6)}(0)$.

(d) Let $P_4(x)$ be the fourth-degree Taylor polynomial for f about $x = 0$. Using information from the graph of $y = \left|f^{(5)}(x)\right|$ shown above, show that $\left|P_4\left(\frac{1}{4}\right) - f\left(\frac{1}{4}\right)\right| < \frac{1}{3000}$.
