Name: _____
AP Calc BC
Calculus Review Part II

Find the limit.

1. $\lim_{x\to\infty}\frac{1-3x+6x^2-x^{10}}{2+4x^4-8x^7+8x^{10}}$

2. $\lim_{x\to\infty}\frac{\sin x}{x}$

3. $\lim_{x\to 3}\frac{\sqrt{x+6}-3}{x-3}$

4. $\lim_{x\to 1}\frac{3}{x-1}$

Find the horizontal and vertical asymptotes of the following functions

5. $f(x)=\frac{3x^2-9x}{x^2-9}$

6. $f(x)=\frac{x^3+3x^2-1}{4-x^3}$

Continuity

7. Find the x-values for which $f(x)=\frac{2}{\sqrt{1-x}}$ is continuous

8. Find the discontinuities of $f(x)=\frac{x^2+5x+6}{x^2-4}$ and categorize them as holes, jumps or gaps.

9. Find all x values for which $f(x)=\begin{cases}2-x, x<-1\\ \frac{1}{x}, -1\le x\le 2\\ \frac{1}{2}, x>2\end{cases}$ is continuous

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Derivatives

10. Find $\frac{dy}{dx}$ if $y = \frac{3x+4}{1-5x}$

11. Find $\frac{d}{dx}(\ln(e^{\sqrt{5x+3}}))$

12. Evaluate y' at x = -1 if $3x - x^2y = 5y$

Curve Sketching

13. Find the critical points, inflection points, the absolute minimum value of y, and the relative maximum points of $y = x^4 - 3x^2 + 2$

Related Rates

14. A 13-foot ladder leaning against a wall starts to slip in such a way that the food of the ladder slips away from the wall at 2 in/sec. How fast is the top of the ladder slipping down the wall when the food of the ladder is 12 inches from the wall?

Integrals

15. Find the area bounded by $y = 1 - x^2$ and the x-axis on [0, 2]

16. Given $\int_a^b f(x)dx = 5$ and $\int_a^b g(x)dx = -3$ evaluate

    a. $\int_a^b [3f(x) - 2g(x)]dx$

    b. $\int_a^b 6f(x)dx + \int_a^b \frac{g(x)}{\pi}dx$

Applications of Integrals

17. Find the volume that results when the area between the graph of $y = \cos x$ and the x-axis from x = 0 to $x = \frac{\pi}{2}$ is revolved about the line x =-1

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18. Solve $\frac{dy}{dx} = 2x(y+1)$ given that y(0)=1

Integrate:

19. $\int e^x \sqrt{e^x}\, dx$

20. $\int \sin^3(4x)\cos(4x)dx$

Free Response

21. Let f be the function given by $f(x) = \frac{1}{2}x^3 - \frac{1}{2}x^2 - 1$
    a. Write an equation of the tangent line at x = -1
    b. List and identify the relative extrema points, both minimum and maximum
    c. What is the inflection point?
22. The acceleration of a particle $a(t) = -32\, ft/\sec^2$, the initial velocity of the particle is 64ft/sec and the initial height of the particle is 40 ft.
    a. What is the formula for the velocity of the particle at any time t?
    b. What is the formula for the position of the particle at any time t?
    c. What is the maximum height this particle reaches?
23. $x^2 - xy + 4y^2 = 16$
    a. What is the slope in terms of x and y?
    b. What is the slope of this curve when x = 0 and y = -2?
    c. What is $\frac{d^2y}{dx^2}$ at x = 1