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Calculator 11 – 16 AP Calculus BC Skinny – Summer Work

1. Evaluate $\lim_{x\to 1} \frac{x^2+x-2}{x-3}$.

2. Find all critical numbers for the function $f(x) = \frac{x-1}{x+3}$.

a. 1 b. 1, -3 c. -3 d. 1, -1 e. None

3. If $f(-5) = 0, f'(-5) = -10, g(-5) = 1, and\ g'(-5) = -\frac{1}{5}$, find $h'(-5)$ if $h(x) = \frac{f(x)}{g(x)}$.

4. Let $f"(x) = 4x^3 - 2x$ and let $f(x)$ have critical numbers -1, 0, and 1. Use the Second Derivative Test to determine which critical number(s), if any, give(s) a relative maximum.

a. -1 b. 0 c. 1 d. -1 and 1 e. Cannot be determined

5. Find all intervals on which the function $f(x) = \frac{x^2+1}{x^2}$ is concave upward.

a. $(-\infty, \infty)$ b. $(-\infty, -1) \cup (1, \infty)$ c. $(-\infty, 0) \cup (0, \infty)$ d. $(1, \infty)$

6. Find all points of inflection on the function $f(x) = x^3 - 12x$.

a. (0, 0), $(\pm\sqrt{12}, 0)$ b. (0, 0) c. (2, 0), (-2, 0) d. (2, 16), (-2, 16)

7. Find the values of x for all points on the graph of $f(x) = x^3 - 2x^2 + 5x - 16$ at which the slope of the tangent line is 4.

8. Find all open intervals on which $f(x) = \frac{x^2}{x^2+4}$ is decreasing.

a. $(0, \infty)$ b. $(-2, 2)$ c. $(-\infty, 0)$ d. $(-\infty, \infty)$

9. Sand erodes from a section of beach at a rate of $E(t)$ cubic yards per day. The values of the rate are shown in the table below. Use a right edge Riemann sum with n = 3 to approximate the total amount of sand that eroded over the 3 day period.

t (days)	0	1	2	3
E(t) (cu. yds/day)	90	80	70	90

10. The acceleration of a particle at time *t* is given by $a(t) = 6t + 4$ and the velocity and position at *t* =1 are $v(1) = 9$ and $s(1) = -5, \text{respectively.}$ Find $s(t)$.

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11. Given $F(x) = \int_2^x \frac{1}{1+t^4}\,dt$, find $F'(x)$ and $F'(2)$.

12. Evaluate $\int x^2(x^3+5)^6\,dx$.

(13 – 14) Consider the region bounded by the graphs of $f(x) = 3x^2$ and $g(x) = 2x + 1$.

13. Find the area of the region.

14. Find the volume of the solid formed by revolving the region about the x-axis.

15. Find the average value of the function $f(x) = \frac{2}{x+3}$ on the interval [-1, 1].

16. Use the given graph of the derivative f' to find the location of all relative extrema and points of inflection of the function *f*.