

Calculus Worksheet

Your Name:

1. Find the equation of the tangent line to the curve $y = x^3 - x$ at $x = -1$.

2. At what value(s) of x does $f(x) = x^7 - 5x^4 - x$ have a relative minimum?

3. On what interval(s) is the function $f(x) = -x^5 + x^3 + 25x$ decreasing? On what interval(s) is it concave up?

4. If $x + 2y = x^2y^3$, find $\frac{dy}{dx}$.

5. Evaluate the limit:

$$\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$$

6. Let f be the function given by $f(x) = x^5$. What are all the values of x that satisfy the conclusion of the Mean Value Theorem on the interval $[-2,3]$?

7. The velocity of a particle moving in a straight line is given by $v(t) = 4t - 7$. What is the position function $p(t)$ for the particle at time t if $p(3) = 17$? What is the net change in position from $t = 1$ to $t = 7$? What is the total distance the particle travels in that time?

8. For the function $f(x) = 6 - x^{3/5}$, $\int_0^4 f(x) dx$ is approximated by a Riemann Sum using the value at the right edge of each of four intervals of width 1. Compute the value of the approximation.

9. Use the Squeeze Theorem to show that

$$\lim_{x \rightarrow 0} x^4 \cos \frac{\pi}{x} = 0$$

Illustrate using $f(x) = x^4$ and $h(x) = -x^4$ as the squeezing functions.

10. A cylinder has equal height and base diameter. If both are increasing at a rate of 1.5 meters per second, how fast is the surface area increasing when the volume is 12.3 cubic meters?