

Lab worksheet for Tuesday, 26 Jan 2021

Practice: Derivatives of Polynomials

1. Let $f(x)=7 + x + x^2$.

a) Find the derivative of $f(x)$.

b) Find $f'(1)$.

c) Find $f'(-3)$.

2. Let $g(x)= x^3 + 2x + 2021$.

a) Find the derivative of $g(x)$.

b) Find $g'(0)$.

c) Find $g'(2)$.

3. Let $f(x) = x^{2601} + 5x^4 + x^2 + 1$.

a) Find the derivative of $f(x)$.

b) Find $f'(1)$.

c) Find $f'(-1)$.

4. Let $f(x) = 4x^3 - x^2$.

a) Find the derivative of $f(x)$.

b) Find the slope of the tangent to the graph of the $f(x)$ at $x_0=0$.

c) What word would you use to describe the tilt of this tangent line? .

5. Let $s(t) = 6t^5 - 3t^4 + 0.5t + \sqrt{2}$.

a) Find the derivative of $s(t)$.

b) Find $s(0)$.

c) Find $s'(-1)$.

6. If a rock is thrown upward on the planet Mars with a velocity of 10 m/s, its height in meters t seconds later is given by $y = 10t - 1.86t^2$. Find the instantaneous velocity of the rock when $t = 1$.

7. Let $y = f(x) = \frac{1}{4} - \frac{1}{3}x + x^2 - 0.5x^4$

a) Find the derivative of $f(x)$.

b) Find $y'(2)$.

c) Find $y'(3)$.

8. Find the derivative of the function:

a) $f(x) = \frac{x^4}{2} - \frac{2x^3}{3} + \frac{4x^2}{5} - 1$.

b) $h(x) = 3x^5(8 - 3x^5)$.

9. Find the derivative of the function:

a) $y = x^5 - 4x^3 - x^2 + \frac{x}{2}$.

b) $y = -9x^3 + 0.2x^2 - 0.14x + 5$.

10. Let $f(x) = x^2 - 3x + 2$.

a) Find $f'(x)$.

b) At which point or points is the tangent line to the graph of f horizontal?

c) At which points does the tangent line to f have a positive slope? At which points is the slope of the tangent line negative?

11. Let $f(x) = x^3 - 3x^2 + 2$.

a) Find $f'(x)$.

b) Find all x so that $f'(x) > 0$.

c) Find all x so that $f'(x) < 0$.

12. Let $S(r)$ be the area of a circle with radius r . What does $S'(r)$ calculate?

13. Consider parabola $y = -x^2 + 3x - 2$. Find the equation of the tangent line of this parabola at $x_0 = 2$.