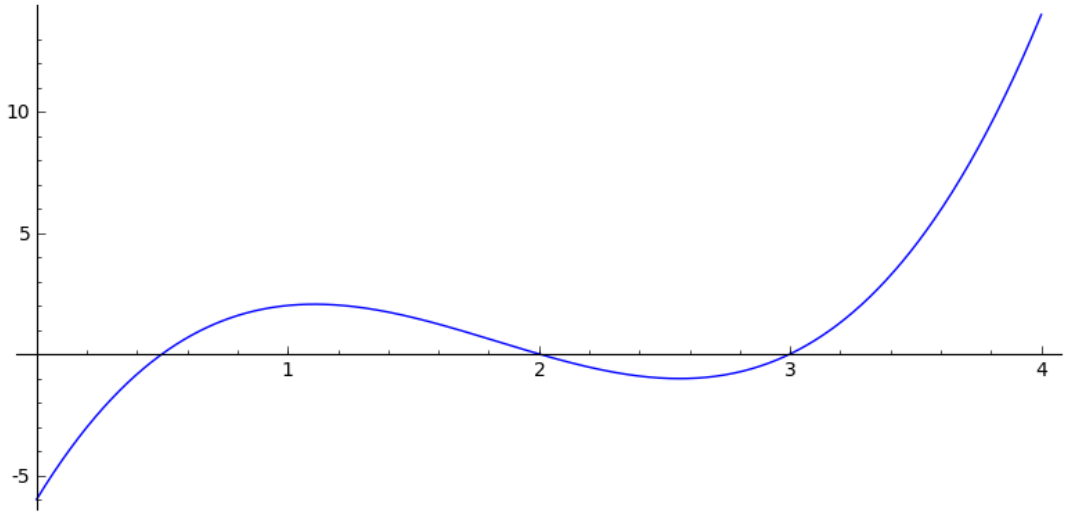

Figure 1: $y = 2t^3 - 11t^2 + 17t - 6$

1. Evaluate the indefinite integral $\int 2t^3 - 11t^2 + 17t - 6 \; dt$.

2. Refer to the graph above while evaluating the following integrals.

a) $\int_0^{\frac{1}{2}} 2t^3 - 11t^2 + 17t - 6 \; dt$

b) $\int_0^2 2t^3 - 11t^2 + 17t - 6 \; dt$

c) $\int_0^3 2t^3 - 11t^2 + 17t - 6 \; dt$

3. Define a new function $F(x) = \int_0^x 2t^3 - 11t^2 + 17t - 6 \; dt$.

a) Try to identify the local extremes of $F(x)$ by interpreting $F(x)$ as a combination of areas under the graph in Figure 1. Skip this one and come back later it doesn't make sense now.

b) Evaluate the integral to find an expression for $F(x)$ that doesn't involve integration.

c) Find the local extrema of $F(x)$ using the methods of chapter 3. Hint: Figure 1 may tell you how to factor $F'(x)$.

4. Compare your answer for problem 1 with that for 3b. Compare $F'(x)$ with $2t^3 - 11t^2 + 17t - 6$.

5. The Fresnel function S is defined as $S(x) = \int_0^x \sin\left(\frac{\pi t^2}{2}\right)\, dt$. Do not try to evaluate this function as you did in 3b (because you can't).

a) Let $F(t)$ be an antiderivative of $f(t) = \sin\left(\frac{\pi t^2}{2}\right)$. Use the evaluation theorem to express $S(x)$ in terms of F.

b) Differentiate your answer for part a to find $S'(x)$.

6. Fill in the conclusion of the following theorem.

Theorem 1. *If f is continuous on $[a, b]$, then* $\frac{d}{dx}\left[\int_a^x f(t)dt\right] =$