Theorem 7.5. The following theorem gives a very detailed
formulation of the asymptotic formula. Let $u \in [x, y]$ and define

$$f'(x) = \int_u^x f'(y) \, dy$$

We will also need to define a periodic extension of $f(x)$:

$$f(x) = f(x + 2\pi)$$

and thus

$$f(x) \int_0^1 \frac{1 - \cos \theta}{\cos \theta} = \frac{1 - \cos \theta}{\cos \theta} - 1$$

For all odd integers $n$.

The first few numbers are

$$0 = g \quad \frac{1}{1}$$

Also of interest are the Bernoulli numbers, defined implicitly by

$$(n)_{(n-1)j} = (n)_{(n-1)j} \int_0^1 f'(y) \, dy$$

With these polynomials,

$$z(x - 1) = (x)^{2}g \quad \frac{1}{1}$$

The first few polynomials are

$$0 = g \quad 0 = (0)^{2}g$$

The Bernoulli polynomials $B_n(x)$ are defined implicitly by the

$$B_n(x) = \frac{1}{n!} \int_0^1 t^n (e^{xt} - 1) \, dt$$

function $f(x)$.

$\int_0^1 t^n (e^{xt} - 1) \, dt$ when $n \geq 0$.

For use in the next theorem, we introduce the

$B_n(x)$ and $B_n(x)$.

Examples are $(2, 3)$ and $(5, 18)$ from Section 7.1.
Theorem. It can be shown that the error term in (2.4.28) can be simplified using the integral mean value.

The proof for \( I < m \) is essentially the same:

\[
\int \frac{(x-x)x x(x)_{(\theta)} I}{x} + [(x), f - (\theta), f] \frac{I}{x} = \int \frac{(x-x)x x(x)_{(\theta)} I}{x} + f - (\theta), f \frac{I}{x}.
\]

For the proof of general \( I < m \), we consider the following problem (3.2.32):

Taking advantage of special relations for the formal polynomials, we continue the deduction by parts. This can be achieved by parts twice to obtain the case of (5.4.9) and hence the following integral mean value:

\[
\int \frac{(x-x)x x(x)_{(\theta)} I}{x} + f - (\theta), f \frac{I}{x} = \int \frac{(x-x)x x(x)_{(\theta)} I}{x} + f - (\theta), f \frac{I}{x}.
\]

Then as before, we can prove that the result is:

\[
\int \frac{(x-x)x x(x)_{(\theta)} I}{x} + f - (\theta), f \frac{I}{x} = \int \frac{(x-x)x x(x)_{(\theta)} I}{x} + f - (\theta), f \frac{I}{x}.
\]
Example In order to prove uniqueness, we need to show
that for any given $u = q$ and $v = n$, the function $f(x)$ is not unique.

\[ f(x) = \frac{1}{x} \]

Proof Let $f(x)$ be defined as

\[ f(x) = \frac{1}{x} \]

Then for all $x > 0$, there exists a unique solution to the differential equation.

**Corollary 1** If $f(x)$ is continuous and differentiable for $x > 0$, then there exists a unique solution to the differential equation.

\[ f(x) = \frac{1}{x} \]

This result is illustrated in Table 1. For $f(x) = (x)^{1/2}$, the corresponding integral is

\[ \int (x)_{x^2 \rightarrow 0} f(x) = (f)^{1/2} \]

Thus, for $q \leq 3 < p$,

\[ f(x) = \frac{1}{x} \]

This is a contradiction, as $f(x)$ is not unique.