Problem 1

Since \( f \) is continuous on the closed interval \([a, b]\), by the Extreme Value Theorem, the function \( f \) takes on a maximum value \( M \) and a minimum value \( N \) on \([a, b]\). Then

\[
(b - a)N \leq \int_a^b f(x) \, dx \leq (b - a)M
\]

so

\[
N \leq \frac{1}{b - a} \int_a^b f(x) \, dx \leq M
\]

By the Intermediate Value Theorem, there must exist a value of \( c \) with \( a \leq c \leq b \) such that

\[
f(c) = \frac{1}{b - a} \int_a^b f(x) \, dx. \tag{1}
\]

\textbf{Note:} I can make a reference to a labeled thing like equation \([1]\) with \texttt{\eqref{1}}, or I can do it like with \texttt{\autoref{1}} to get Equation 1. Here’s a QED tombstone to mark the end of my solution.

Problem 2

I can reference another problem like this: See Problem 3 b or Problem 1.

Problem 3

3 a

The Ackermann function is

\[
A(m, n) := \begin{cases} 
  n + 1 & \text{if } m = 0 \\
  A(m - 1, 1) & \text{if } m > 0 \text{ and } n = 0 \\
  A(m - 1, A(m, n - 1)) & \text{if } m > 0 \text{ and } n > 0 
\end{cases}
\]

3 b

This is how you do an aligned equation environment:

\[
\begin{align*}
  d(f, h) &= \int_a^b |f(x) - h(x)| \, dx \\
  &= \int_a^b |f(x) - g(x) + g(x) - h(x)| \, dx \\
  &\leq \int_a^b (|f(x) - g(x)| + |g(x) - h(x)|) \, dx \\
  &= \int_a^b |f(x) - g(x)| \, dx + \int_a^b |g(x) - h(x)| \, dx \\
  &= d([f], [g]) + d([g], [h])
\end{align*}
\]
or you can do this to suppress numberings for specific lines

\[ d(f, h) = \int_a^b |f(x) - h(x)| \, dx \]

\[ = \int_a^b |f(x) - g(x) + g(x) - h(x)| \, dx \]

\[ \leq \int_a^b (|f(x) - g(x)| + |g(x) - h(x)|) \, dx \]

\[ = \int_a^b |f(x) - g(x)| \, dx + \int_a^b |g(x) - h(x)| \, dx \]

\[ = d([f], [g]) + d([g], [h]) \]

(2)

so you can have a reference to just \((2)\).

\[ \square \]

**Problem 4**

4 a

Follow [this link](#) to find out more about source code formatting.

```java
for (int n : new int[]{17, 34, 51, 68, 85}) {
    System.out.println(n);
}
```