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

$$f(c) = \frac{1}{b - a} \int_{a}^{b} f(x) \, dx. \quad (1)$$

Note: I can make a reference to a labeled thing like equation $[1]$ with \eqref, or I can do it like with \autoref 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

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

3 b

This is how you do an aligned equation environment:

$$d(f, h) = \int_{a}^{b} |f(x) - h(x)| \, dx$$

$$= \int_{a}^{b} |f(x) - g(x) + g(x) - h(x)| \, dx$$

$$\leq \int_{a}^{b} (|f(x) - g(x)| + |g(x) - h(x)|) \, dx$$

$$= \int_{a}^{b} |f(x) - g(x)| \, dx + \int_{a}^{b} |g(x) - h(x)| \, dx$$

$$= d([f], [g]) + d([g], [h]) \quad \Box$$
or you can do this to suppress numberings for specific lines

\[
d(f, h) = \int_{a}^{b} |f(x) - h(x)| \, dx
\]

\[
= \int_{a}^{b} |f(x) - g(x) + g(x) - h(x)| \, dx
\]

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\]

\[
= \int_{a}^{b} |f(x) - g(x)| \, dx + \int_{a}^{b} |g(x) - h(x)| \, dx
\]

\[
= d([f], [g]) + d([g], [h]) \tag{2}
\]

so you can have a reference to just \textbf{(2)}. □

**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);
}
```