Class Drill for Section 4.4 The Congruent Segment Construction Theorem

[1] Recall the statement of **Theorem 24**, the Congruent Segment Construction Theorem.

Given a segment $\overline{AB}$ and a ray $\overrightarrow{CD}$, there exists exactly one point E on ray $\overrightarrow{CD}$ such that $\overline{CE} \cong \overline{AB}$.

(a) Draw a picture that illustrates the statement of the theorem.

(b) Here is the first part of the proof, in which it is proven that a point E exists that has the desired property. **Illustrate & justify the steps.**

Proof Part 1: Show that such a point E exists.

(1) The real number $d(A, B)$ exists. **(Justify: How do we know that the real number $d(A, B)$ exists?)** We can call that real number y. That is, $y = d(A, B)$.

(2) There exists a coordinate function f for line $\overleftrightarrow{CD}$ such that $f(C) = 0$ and $f(D)$ is positive. **(Justify.) (Make a drawing.)**

(3) There exists a point E on line $\overleftrightarrow{CD}$ whose coordinate $f(E)$ is the real number y from step (1). That is, there exists a point E on $\overleftrightarrow{CD}$ such that $f(E) = y$. (In function notation, point E would be denoted $E = f^{-1}(y)$.) **(Justify: How do we know that the point *E* exists?) (Hint: Consider the properties do we know that function *f* possesses because it is a coordinate function.) (Make a drawing.)**

(4) Then $d(C, E) = |f(E) - f(C)| = |d(A, B) - 0| = d(A, B)$. **(Justify the first two equal signs.)**
This tells us that $\overline{CE} \cong \overline{AB}$.

End of Proof Part 1