Answers to selected Imposing Coordinates problems

Answer 2.1  (a) \( d = \sqrt{2}, \Delta x = 1 = \Delta y = 1 \).  (b) \( d = \sqrt{5}, \Delta x = -1, \Delta y = -2 \).  (c) \( d = \sqrt{34}, \Delta x = 5, \Delta y = -3 \).  (d) 
\[ d = \sqrt{10t^2 + 2t + 1}, \Delta x = 3t, \Delta y = 1 + t. \]

Answer 2.2  (a) True.  (d) \( \Delta x = s - a, \Delta y = t - b \).  (e) 
\[ \Delta x = a - s, \Delta y = b - t \].  (f) \( \Delta x = 0 \) means the points line on the same vertical line; \( \Delta y = 0 \) means the points line on the same horizontal line.

Answer 2.3  Just after 12:29 PM that afternoon.

Answer 2.4  (a) Erik=6.818 mph, Ferry = 17.6 ft/sec.  (b) Impose coordinates with Kingston the origin and units of miles on each axis; then Edmonds is located at (1,0) and Erik's sailboat is at (3,2).  The table rows have these entries:

<table>
<thead>
<tr>
<th>( (0,0) )</th>
<th>( (0,1) )</th>
<th>( (1,0) )</th>
<th>( (1,4) )</th>
<th>( (12,0) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( (3,2) )</td>
<td>( (3,1.9432) )</td>
<td>( (3,1.2045) )</td>
<td>( (3.2 - 6.818t) )</td>
<td></td>
</tr>
<tr>
<td>3.606</td>
<td>3.491</td>
<td>2.003</td>
<td>( \sqrt{(12t - 3)^2 + (2 - 6.818t)^2} )</td>
<td></td>
</tr>
</tbody>
</table>

(c) Use coordinates as in (b), then when the ferry reaches (3,0), Erik is at (3.0.296).  (d) CG vessel does not catch the ferry before Edmonds.

Answer 2.5  (a) \( d(t) = (65.3)t \).  (b) 227 minutes, 198.4 miles  (c) \( t = 80.86 \) seconds.

Answer 2.10  If the origin is the gliderport:  (a) \( (200,210) \).  (b) \( (550, -425) \).  (c) \( (300, -500) \).  (d) \( (0,0) \).  If the origin is the hang glider:  (a) \( (0,0) \).  (b) \( (330, -635) \).  (c) \( (100, -710) \).  (d) \( (200, -210) \).  If the origin is the boat:  (a) \( (-100, 710) \).  (b) \( (250, 75) \).  (c) \( (0,0) \).  (d) \( (-300, 500) \).

Answer 2.11  (b) 6 + 2\sqrt{5}.  (c) 62.83 sec.  (d) \( (1,0.67) \).  (e) 12 seconds.  (f) 24 seconds.  (g) 36 seconds to 49.42 seconds.

Answer 2.12  (b) \( t = 2 \).  (c) \( (3,3) \).  (d) spider=(\( \frac{1}{3}, \frac{1}{3} \)).  (e) 1.5 feet.  (f) Spider reaches \( (9,6) \) when \( t = 4 \); ant reaches \( (9,6) \) when \( t = 3 \).  (g) spider speed is \( \sqrt{5} \) ft/sec; ant speed is \( \sqrt{5} \) ft/sec.

Answer 2.13  49.92 mph.

Answer 2.14  141.46 miles.  They are 300 miles apart at time 0.826 hr = 49.6 minutes.

Answer 2.15  (a) Final answer is correct, but second equality is wrong.  (b) Final answer should be \( 4xy \); key fact is that \( (x + y)^2 = x^2 + 2xy + y^2 \), etc.  (c) Answer and steps correct.

Answer 2.16  (a) \( x = \pm \sqrt{\frac{1 + \beta}{\alpha^2}} \).  (b) \( x = \frac{\beta}{\alpha + \beta} \).  (c) \( x = \frac{0}{\alpha \beta + 1} \).

Answer 2.17  (a) \( \Delta = 4 \).  (b) \( \Delta = 1 \).  (c) \( (a - b)(a + b) \).  (d) \( a^2 - ab - 6b^2 \).  (e) \( ab \).

Answer 2.18  (a) \( 5t^2 + 6t + 5 \).  (b) \( 2t^2 + 4t \).  (c) \( \frac{2}{t^2 - 1} \).  (d) \( \sqrt{5t^2 + 4t + 4} \).