5. A boy's toy boat slips from his grasp at the edge of a straight river. The stream carries it along at 5 feet per seconds. A crosswind blows it toward the opposite shore at 4 feet per second. If the boy runs along the shore at 3 feet per second following his boat, how fast is the boat moving away from him when $t = 3$ seconds.

6. Find all local maximum points, all local minimum points, and all saddle points of $f(x, y) = 2x^4 - x^2 + 3y^2$.

7.

(a) Compute $\displaystyle\lim_{\substack{(x,y) \to (0,0) \\ \text{along the } y\text{-axis}}} \frac{x - y}{x + y}$.

(b) Compute $\displaystyle\lim_{\substack{(x,y) \to (0,0) \\ \text{along the line } y=x}} \frac{x - y}{x + y}$.

(c) Compute $\displaystyle\lim_{(x,y) \to (0,0)} \frac{x - y}{x + y}$.

8. Graph and label the level sets of $f(x, y) = 10 - x^2 + y^2$ which correspond to $f = 0$, $f = 10$, and $f = 20$.

9. Find the equations of the line tangent to the curve parameterized by $\overrightarrow{r}(t) = t^2 \overrightarrow{i} + 3t \overrightarrow{j} + 6t^2 \overrightarrow{k}$ at the point $(4, 6, 24)$.

10. The temperature of a plate at the point (x, y) is $T(x, y) = 20 - 2x^2 - y^2$. Find the path that a heat seeking particle would travel if it starts at the point $(1, 2)$. (The particle always moves in the direction of the greatest increase in temperature.)