Mathematics I **Worksheet 5** Name:

1. Use the definition to find the derivative of $f(x) = x^2 + 3x$.

2. Use the definition to find the derivative of $f(x) = 4x^2 + 2x - 3$.

3. Use the definition to find the derivative of $f(x) = \dfrac{3}{2x-1}$.

4. Use the definition to find the derivative of $f(x) = \sqrt{2x-1}$.

5. Find the equation of the line tangent to $f(x) = \sqrt{2x-1}$ at $x = 3$.

6. Find the equation of the line normal to $f(x) = \sqrt{2x-1}$ at $x = 3$.

7. Use the definition to prove $f(x) = |x|$ is not differntiable at $x = 0$.

8. List any points at which the function below is not differentiable. Where is the derivative positive? Where is it negative? Sketch a graph of the derivative.