

Name (20 pts): _____

Each problem is worth 10 points; you must show all your work (excluding arithmetic) for full credit.

1. For the function $f(x)$ depicted below, find the following:

(i) $\lim_{x \rightarrow -2} f(x)$

(ii) $f(2)$

(iii) $\lim_{x \rightarrow 3} f(x)$

(iv) $f(3)$

2. Find the value of the limit algebraically:

$$\lim_{x \rightarrow 13} \frac{x^2 - 12x - 13}{x - 13}$$

3. For the function $f(x) = 2x^2 - 3x + 5$

- (a) Use the definition of the derivative to find $f'(x)$.
- (b) Find a formula for the tangent line when $x = 5$.

4. For the function $f(x)$ pictured below, tell where $f'(x)$ is positive, where it is negative, and where it is zero.

5. Suppose the time required for the brining phase in a recipe for homemade Halloumi cheese is given by

$$T = 30 + 5\sqrt{w}$$

where T is the time (in minutes) and w is the weight of the curds (in grams). Find $T'(20)$, give units, and interpret your answer.

6. Find the derivative:

$$\frac{d}{dx} \frac{\sqrt[7]{x} - \sqrt[4]{x}}{\sqrt[3]{x}}$$