1. (5pts) Find the equation of the line through the points \((-1, 3)\) and \((2, 1)\). Write your answer in slope-intercept form.

2. (10pts) Find the vertex and \(x\)-intercepts of \(f(x) = x^2 - 2x - 3\). Then sketch the graph of \(f\).

3. (5pts) Compute and simplify the difference quotient for \(f(x) = -x^2 + 2\).
4. (10pts) Solve the following equation for $x$ and express the solution as an exact value (not as a decimal).

$$2 \left(3^{4x+5}\right) = 14$$

5. (10pts) If a $5000$ investment with continuously compounded interest has a doubling time of 6 years, find a model for the value of the investment.

6. (20pts) Evaluate the following limits algebraically

(a) \( \lim_{x \to 4} \frac{x - 4}{x + 4} \)

(b) \( \lim_{x \to 1} \frac{x}{x^2 - 1} \)

(c) \( \lim_{x \to -3} \frac{x^2 + x - 6}{x^2 + 7x + 12} \)

(d) \( \lim_{x \to \infty} \frac{5x^2 - 20}{2x^2 + 5x + 3} \)
7. (16pts) The graph of the function $f$ is given below. Use the graph to evaluate the following expressions.

(a) $\lim_{x \to -2} f(x)$  
(b) $f(-2)$

(c) $\lim_{x \to 1^-} f(x)$  
(d) $\lim_{x \to 1^+} f(x)$

(e) $\lim_{x \to 1} f(x)$  
(f) $f(1)$

(g) $\lim_{x \to 0} f(x)$  
(h) $f(0)$

8. (4pts) The graph of the function $f$ is given below.

(a) Is $f$ continuous at $x = 1$? Explain your answer. (You only need to write one or two sentences.)

(b) Is $f$ continuous on its domain? Explain your answer. (You only need to write one or two sentences.)
9. (20pts) Timmy has started selling popsicles. If \( p \) is the price he charges for each popsicle and \( q \) is the number of popsicles he sells then his demand equation is \( q = -10p + 50 \) and his supply equation is \( q = 5p + 20 \).

(a) Find the equilibrium point.

(b) Use the demand equation to find the revenue, \( R(q) \), as a function of the quantity.

(c) If Timmy’s fixed costs are $17.50 and the marginal cost is $1.50 per popsicle, write a linear cost function, \( C(q) \).

(d) Find the profit function, \( P(q) \).