

1. (30 points) A company charges a fixed fee plus a constant amount per hour for consulting. When a client uses 2 hours of consulting, the total bill is \$140. When a client uses 5 hours, the total bill is \$260.

a) Find a linear function $C(t)$ representing the total cost C in dollars as a function of time t in hours.

b) Interpret the slope and the y-intercept in the context of this problem.

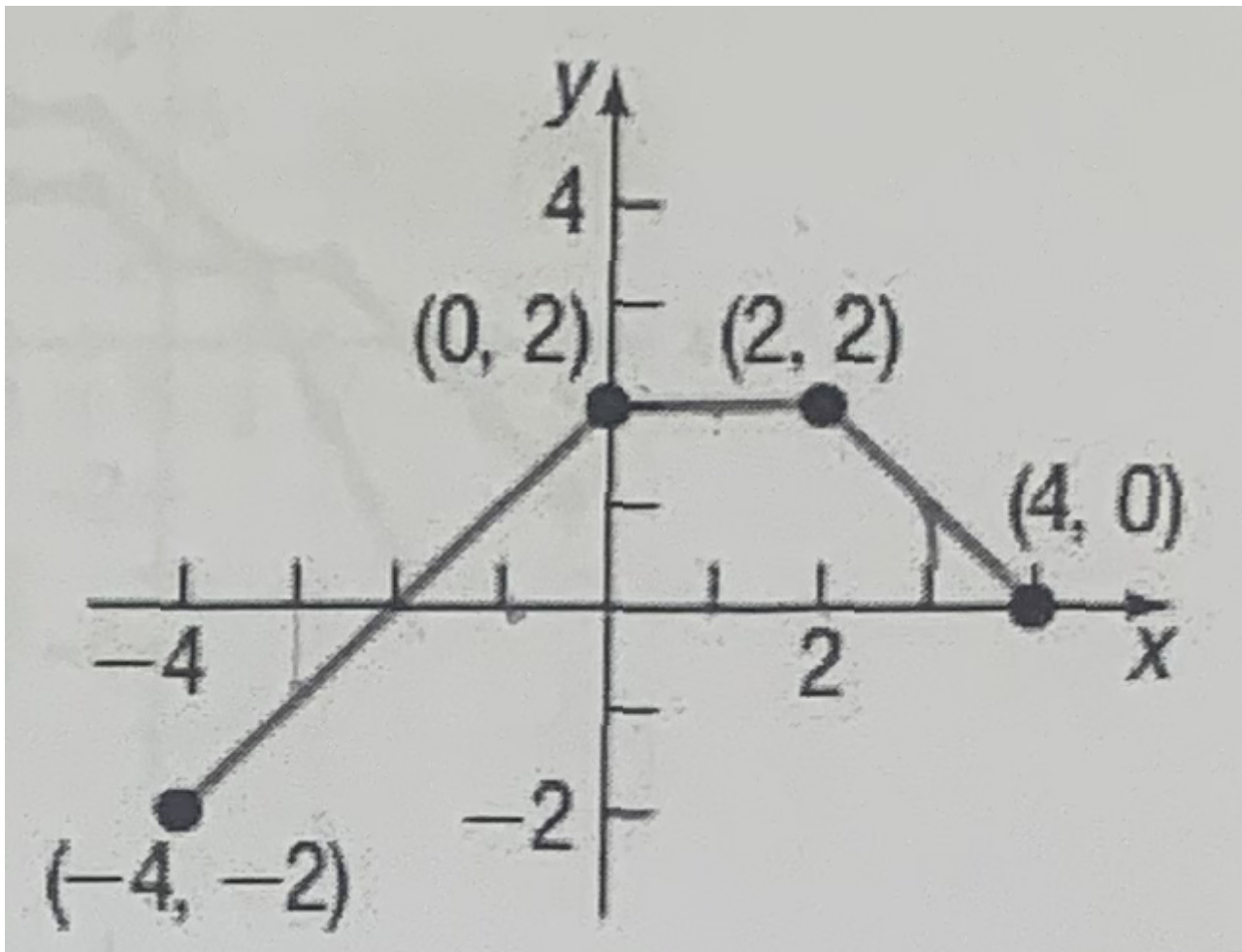
c) Use your model to find the cost of 8 hours of consulting.

2. (30 points) Below is the graph of the function $y=f(x)$.

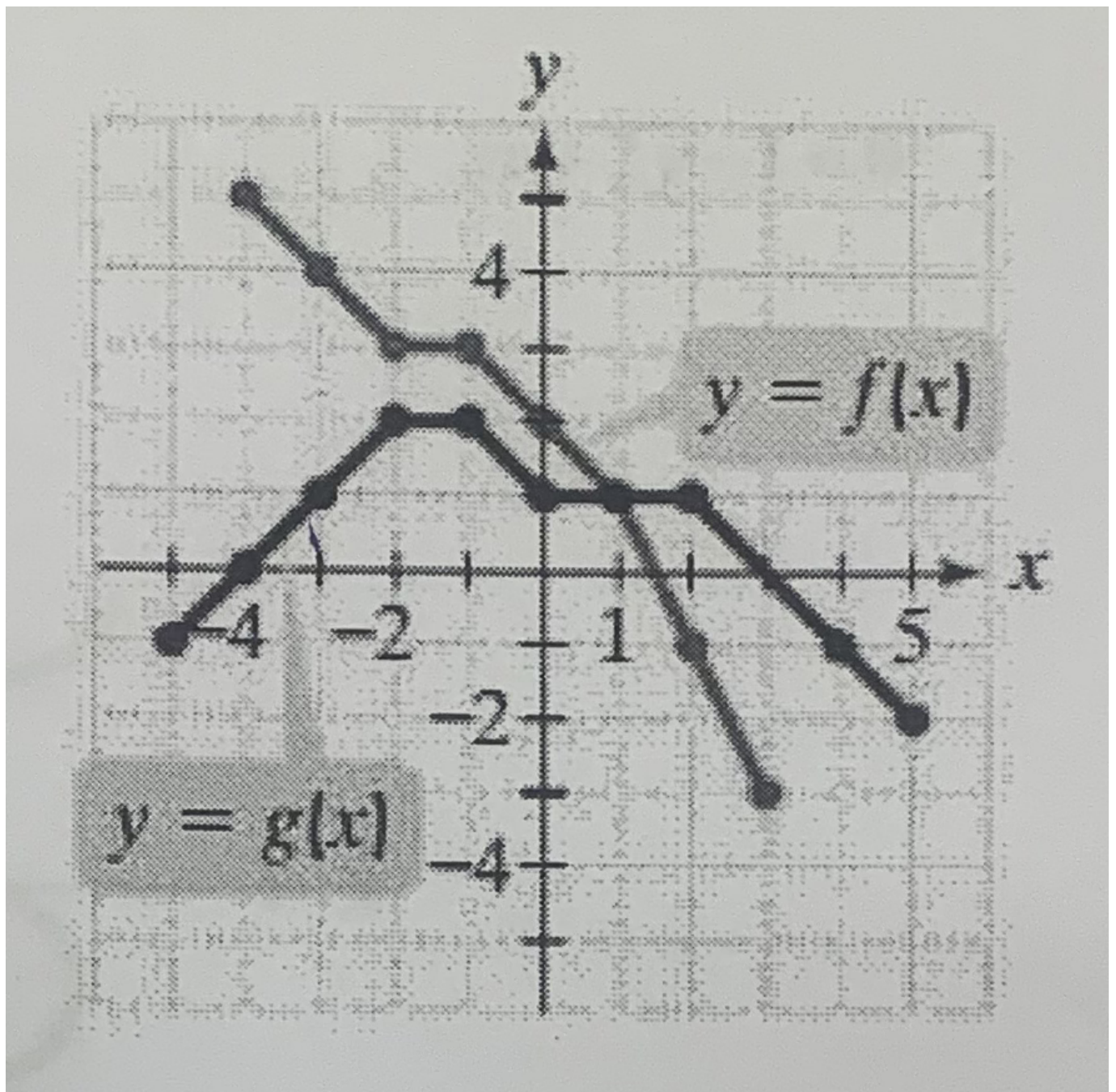
Draw the graph of the following functions:

a. $y = f(x + 1) - 2$

b. $y = -f(x)/2$



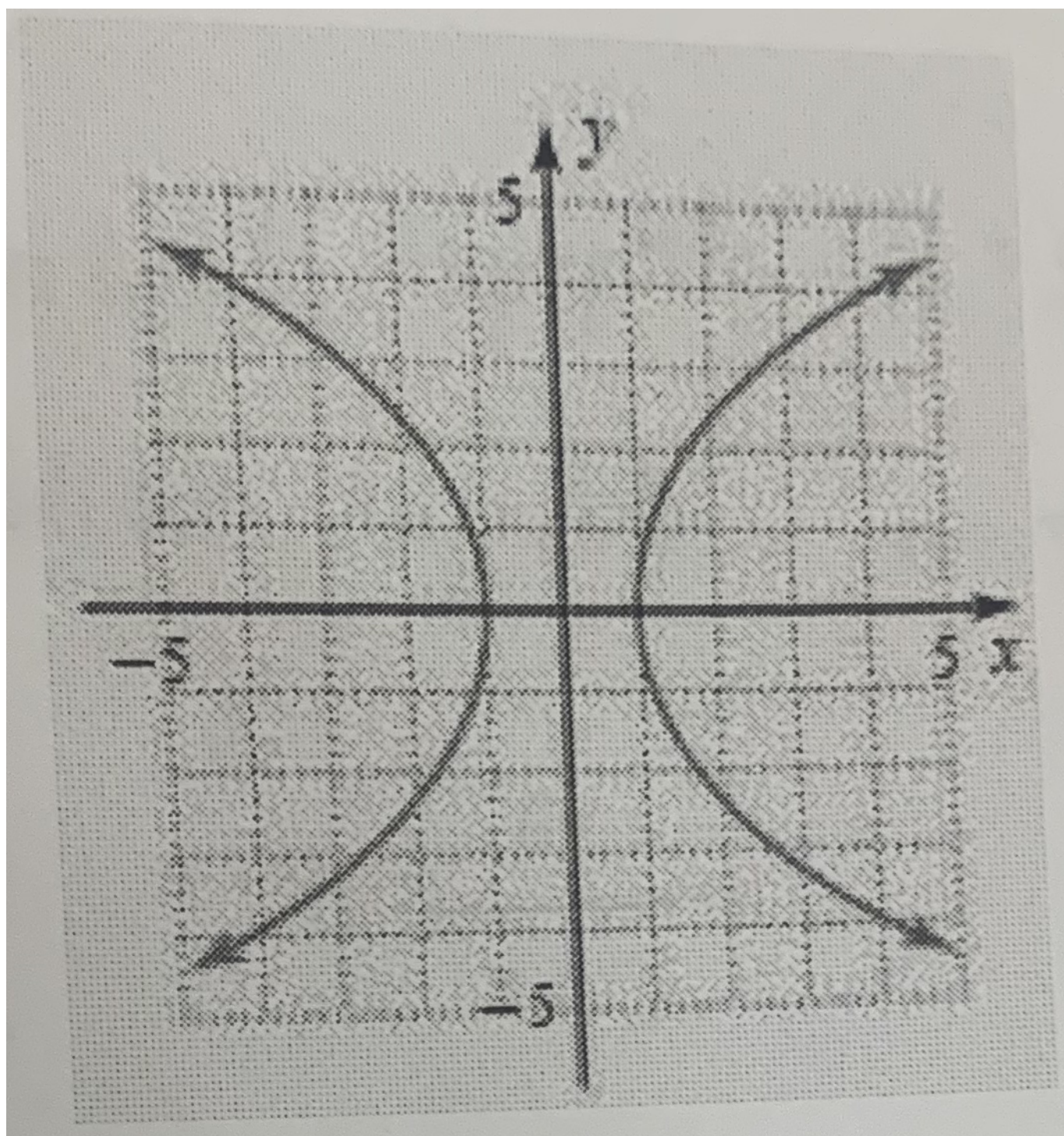
3. (30 points) Use the graph of $f(x)$ and $g(x)$ in the picture below to find



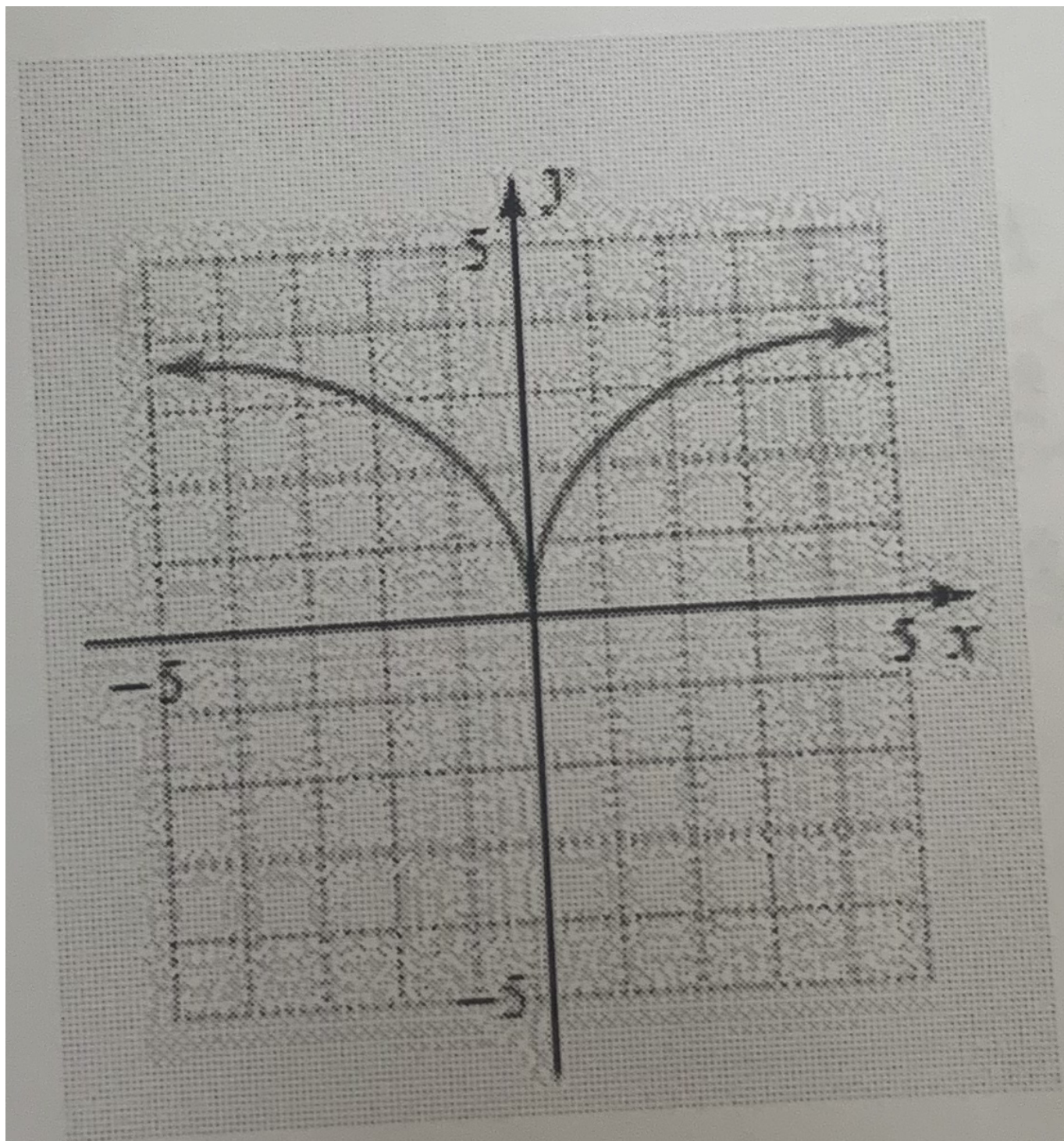
- $(g - f)(-2) =$
- $(fg)(-1) =$
- $(f \circ g)(4) =$
- $(g \circ f)(-2) =$
- $(g/f)(2) =$

4. (30 points) Determine if the following equations and graphs represents y as a function of x ? Explain your answer.

- $x = |y - 2|$
-



C.



5. (40 points)

- a) Find the asymptotes of the following functions $\frac{x^2+x-6}{x-3}$
- b) Use the synthetic division to divide: $\frac{x^5+x^3-2}{x-1}$

6. (30 points)

You want to have \$10,000 in an investment account at a future time. The account earns interest continuously at an annual rate of 5.6%. You plan to deposit an unknown amount P dollars now (at $t=0$).

After 3 years, you deposit an additional \$2,000 into the same account.

After a total of 8 years from your initial deposit, the account balance is exactly \$10,000.

(a) Write an expression for the amount in the account at $t=8$ in terms of P , using continuous compounding.

(b) Use your expression to solve for the initial deposit P . (You may leave your answer in exact form involving exponentials and natural logarithms.)

7. (40 points)

a) Solve the following inequality and draw the solution sets on the real line: $\frac{1}{x+1} > \frac{2}{x-1}$

b) Solve the equation

$$\log_3(x+1) + \log_3(x+4) - 2 = 0$$

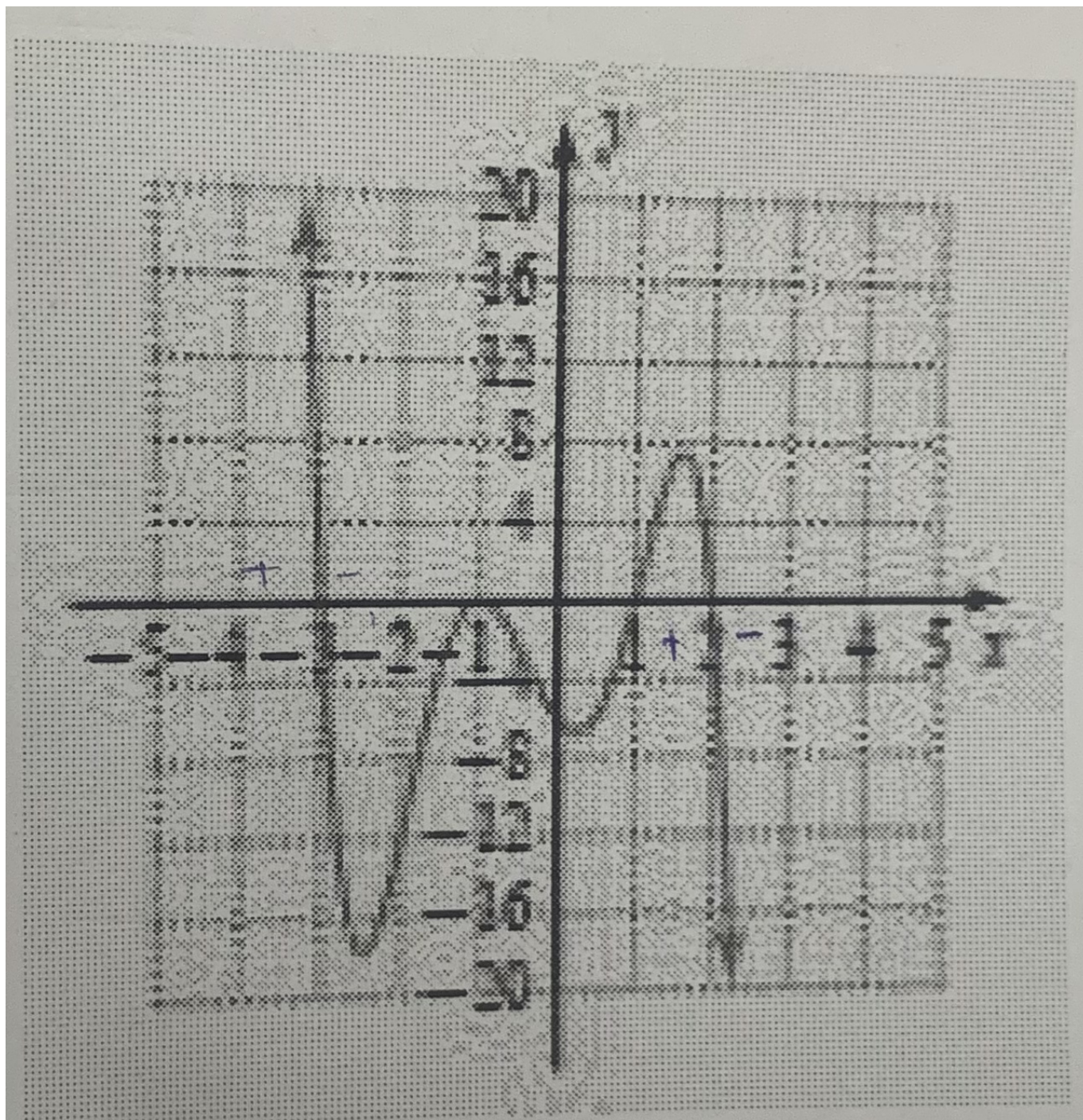
8. (40 points) For the polynomial graph below (Assume all zeroes are real).

(a) state whether the degree of the function is even or odd;

(b) use the graph to name the zeroes of f , then state whether their multiplicity is even or odd;

(c) state the minimum possible degree of f and write one possible function for f in factored form;

(d) estimate the domain and range.



9. (30 points) The proportion P of new cars with a global positioning system (GPS) can be modelled by the following function:

$$P(t) = \frac{0.8}{1 + 1.87e^{-0.16t}}$$

Given that $t=0$ represent 2006, $t = 1$ represent 2007, and so on.

- What proportion of new cars in 2006 had a GPS?
- Determine the maximum proportion of new cars that have a GPS?
- When will 75% of new cars have a GPS?