

1. (30 points) A ride-share company charges a fixed "booking fee" plus a constant rate per mile.

- A 6-mile trip costs \$19.80.
- A 14-mile trip costs \$39.40.

(a) Find a linear function $C(d)$ that gives the cost (in dollars) as a function of distance d (in miles).

(b) Interpret the slope and y-intercept of your function in context.

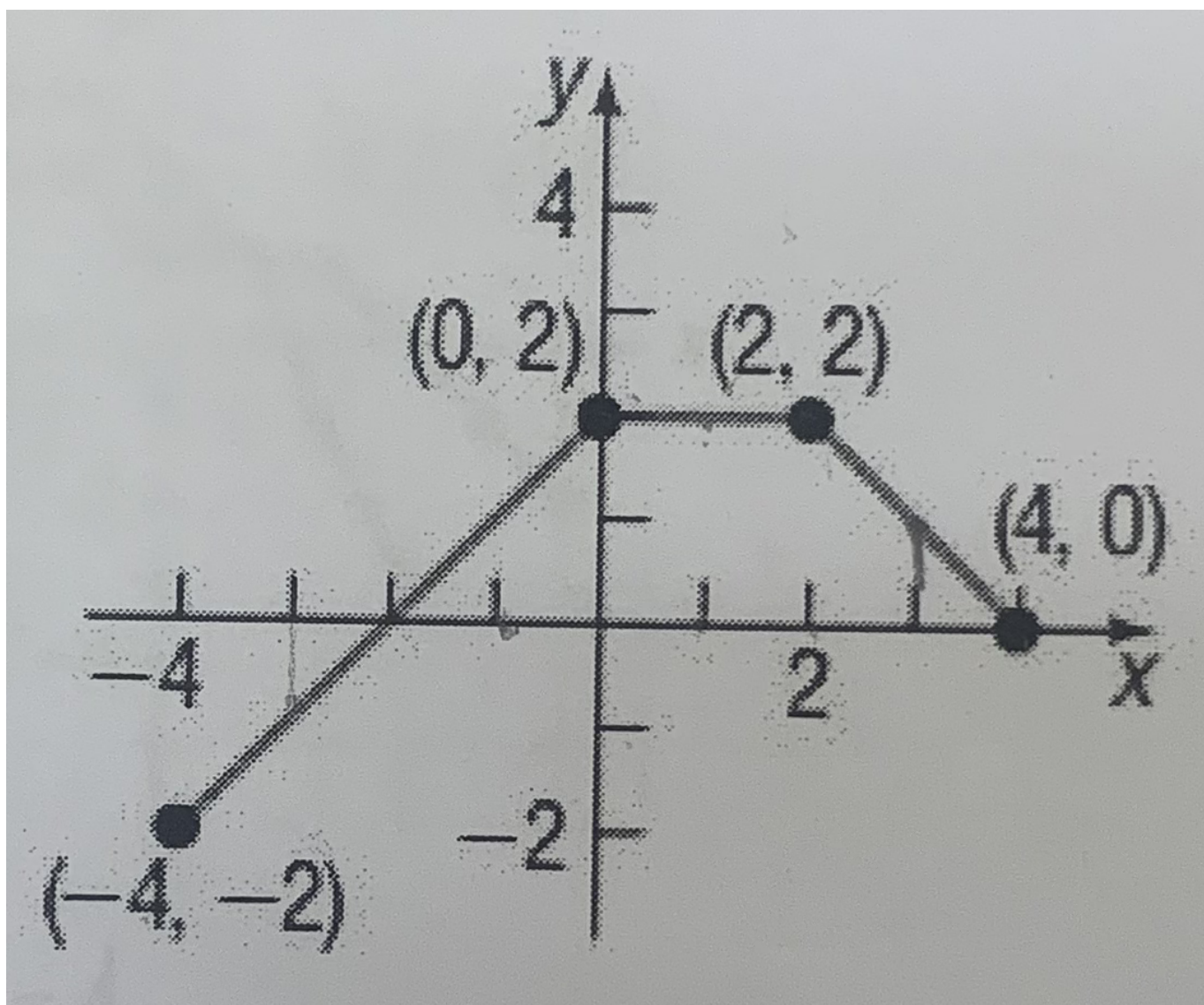
(c) Use your model to find the cost of a 25-mile trip.

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

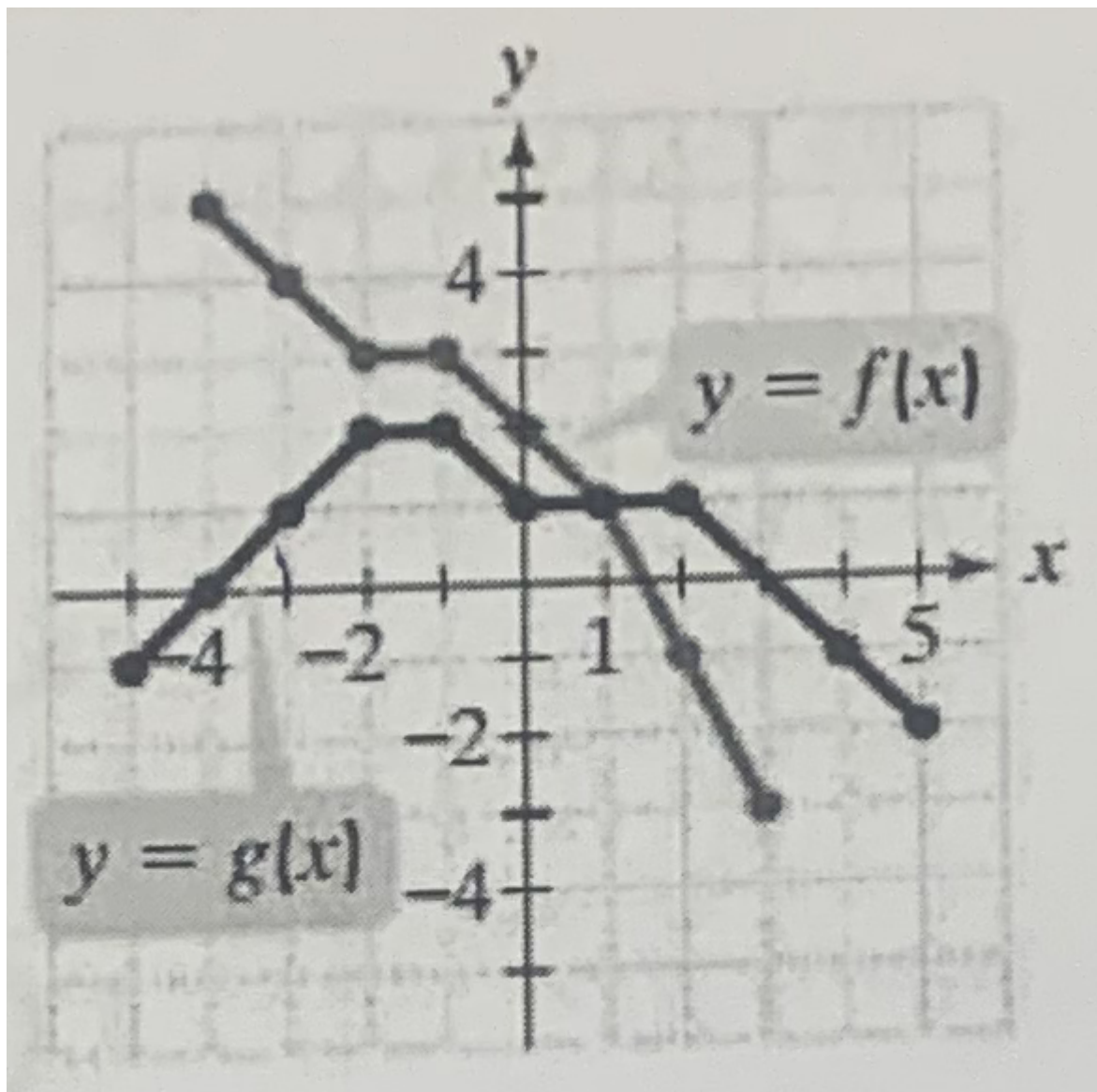
Draw the graph of the following functions:

a. $y = f(x - 2) + 3$

b. $y = f(1 - x)$



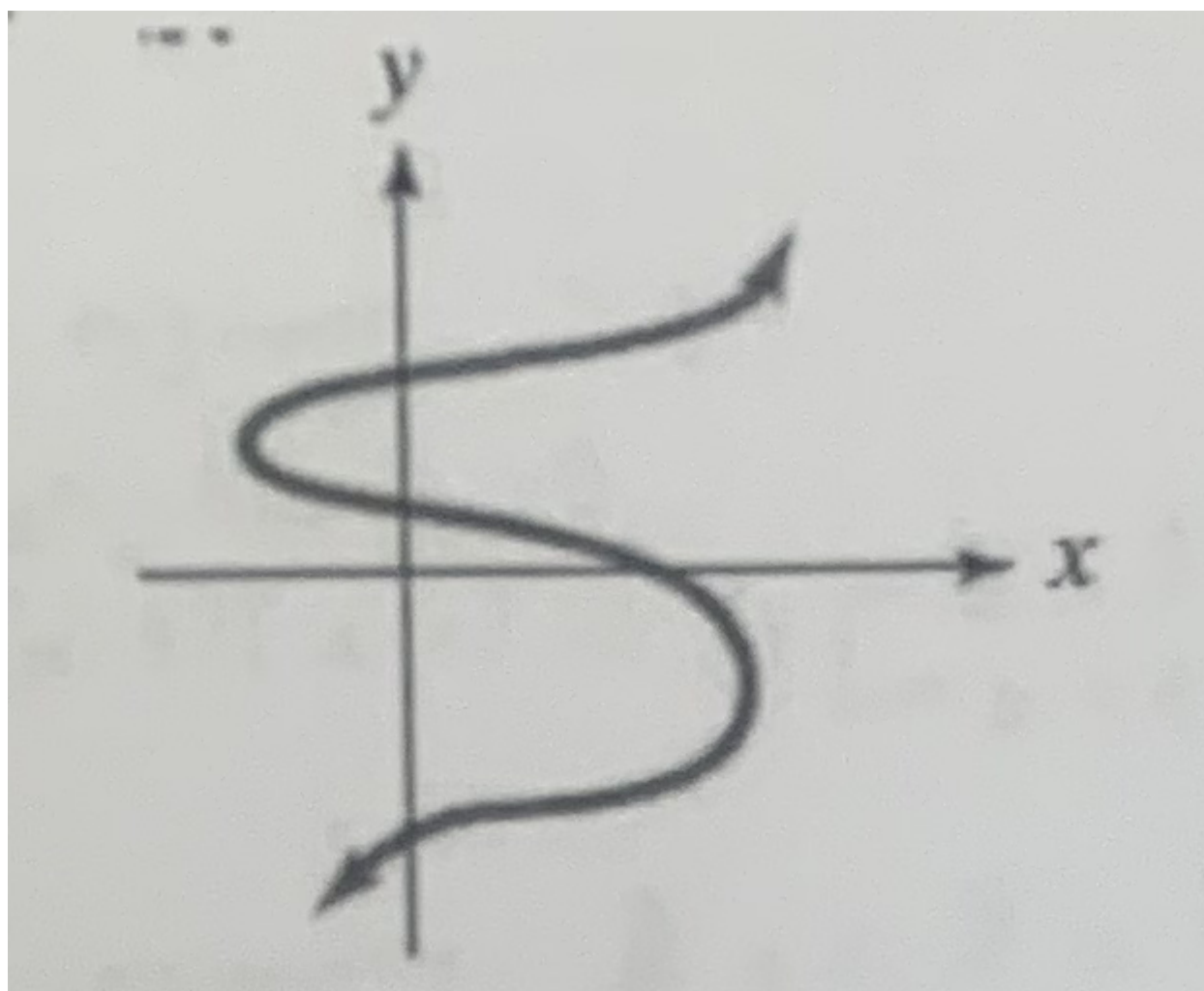
3. (30 points) Use the graph of $f(x)$ and $g(x)$ in the picture below to find



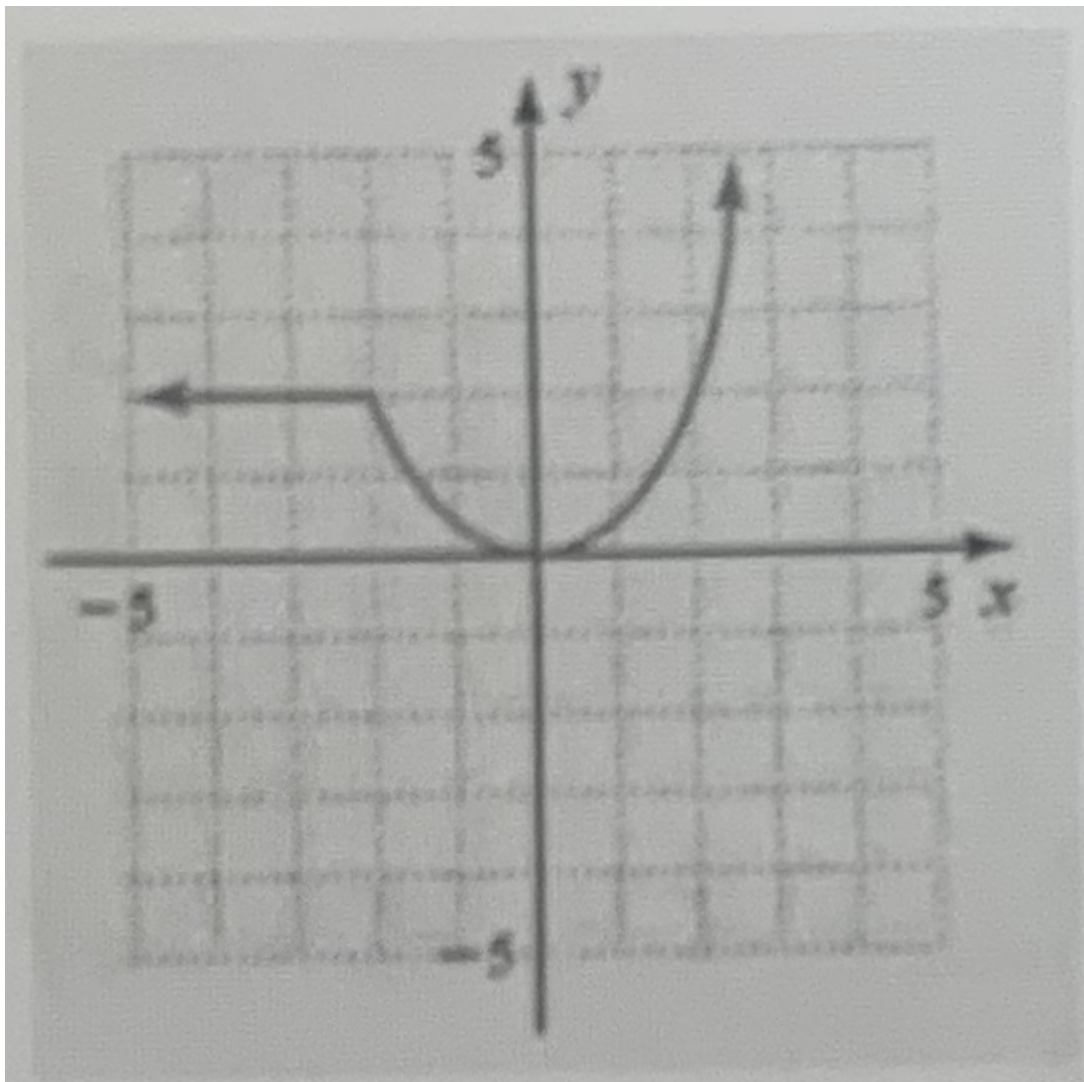
- $(g - f)(-3)$
- $(fg)(2)$
- $(f \circ g)(-2)$
- $(g \circ f)(3)$
- $(g/f)(2)$

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

- $xy + 2y - 1 = 0$
-



c.



5. (40 points)

a) Find the asymptotes of the following functions $\frac{2x^2-3x+5}{x^2-4x+3}$

b) Use the synthetic division to divide:

$$\frac{2x^4 - x^3 + 5x^2 - 2}{x+1}$$

6. (30 points) You want to accumulate money for a graduate school fund. The account earns 5.2% interest compounded continuously.

- You deposit an unknown amount P today ($t = 0$).
- After 4 years, you deposit an additional \$3,000 into the same account.
- After a total of 10 years from your first deposit, you want the account to contain exactly \$20,000.

Assume the account compounds continuously at rate $r = 0.052$.

(a) Write an expression for the account balance $A(10)$ at $t = 10$ years in terms of P , and set it equal to 20,000.

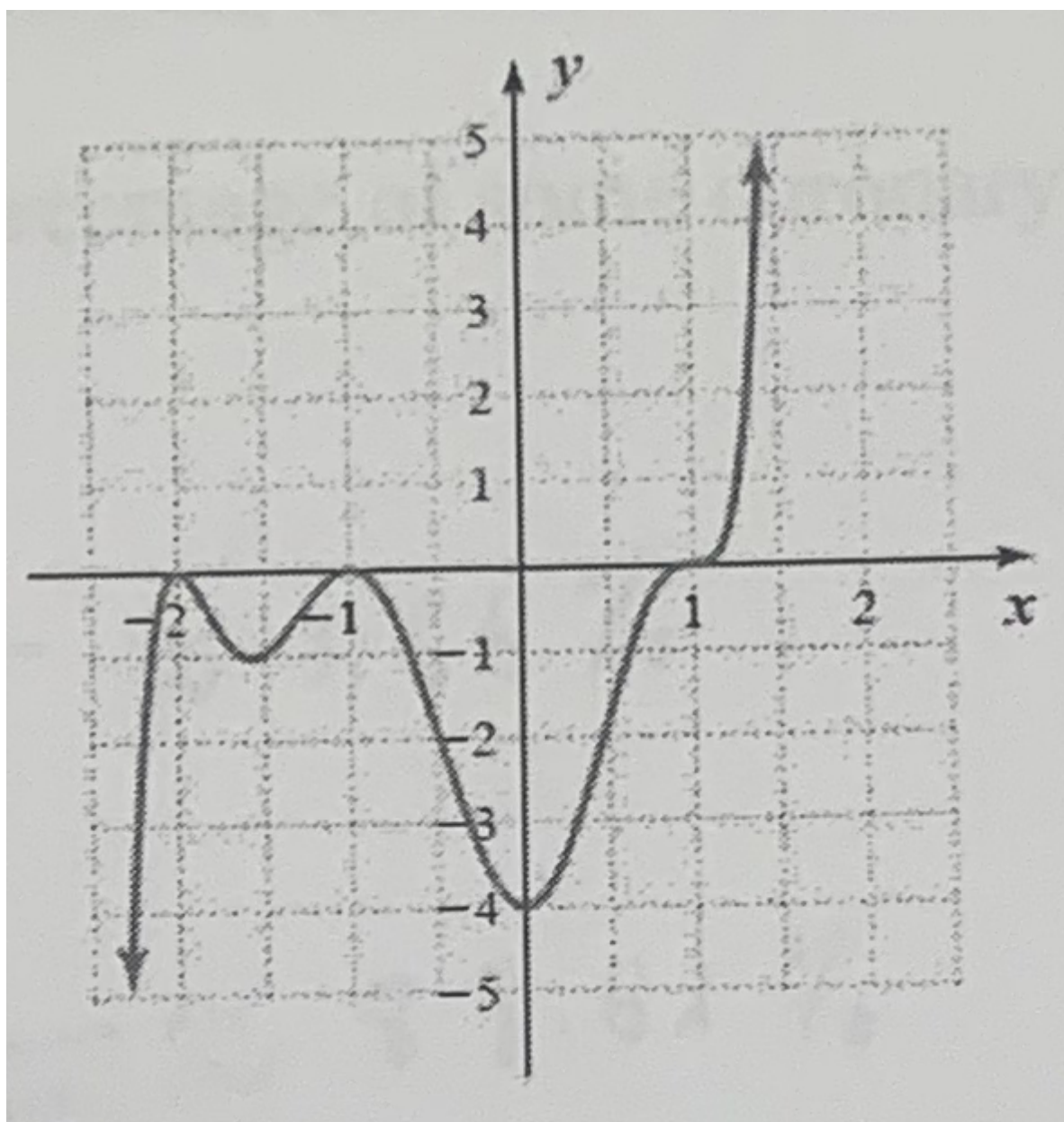
(b) Solve your equation to find the required initial deposit P . You may leave your answer in exact form involving exponentials and natural logarithms.

7. (40 points)

a) Solve the following inequality and draw the solution sets on the real line: $\frac{2x}{x+3} \leq \frac{1}{x}$

b) Solve the equation $\ln(x + 1) - \ln(2x - 4) = \ln 4$

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



- state whether the degree of the function is even or odd;
- use the graph to name the zeroes of f , then state whether their multiplicity is even or odd;
- state the minimum possible degree of f and write one possible function for f in factored form;
- estimate the domain and range.

9. (30 points) The logistic growth function $P(x) = \frac{90}{1+271e^{-0.122x}}$

models the percentage, $P(x)$, of Americans who are x years old with some coronary heart disease.

- What percentage of 20-year-olds have some coronary heart disease?
- What percentage of 80-year-olds have some coronary heart disease?

c) At what age is the percentage of some coronary heart disease 50%?