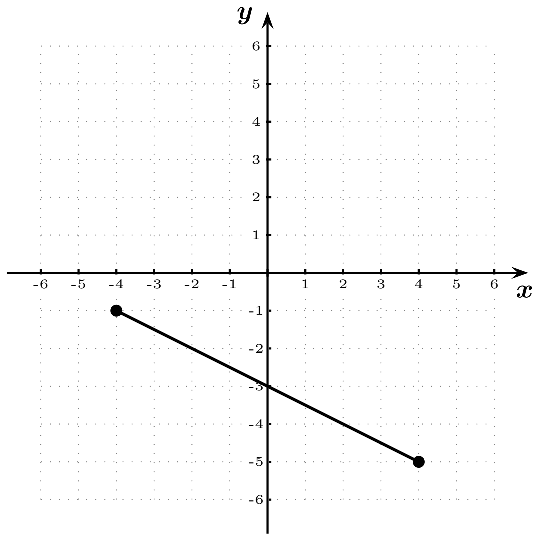
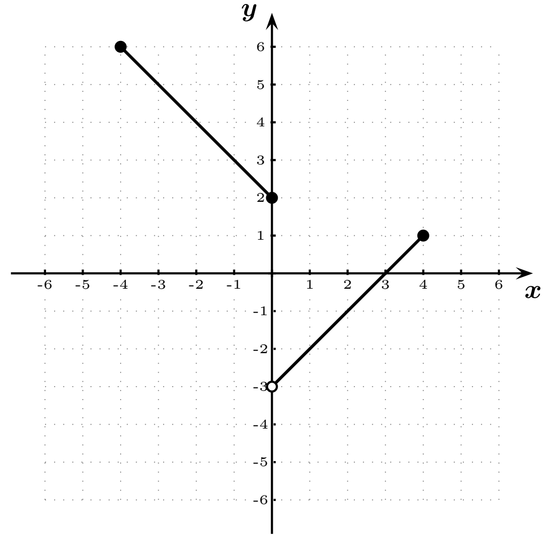
1. (10 points) Let f and g be the functions described by the following graphs:

Graph of f



Graph of g



(a) Fill in the blanks (using interval notation):

The domain of f is .... The range of f is ....

The domain of g is .... The range of g is ....

An interval on which g is one-to-one is: ....

(b) Evaluate the following, if they exist:

$g(0) =$ .... $(f+g)(2) =$ .... $\left(\frac{g}{f}\right)(2) =$ ....

$(g \circ f)(-4) =$ .... $(f \circ f)(2) =$ ....

2. Let $f(x) = x^2 + 5x - 3$ and $g(x) = -2x + 1$. Find $(f \circ g)(x)$ and expand your answer.

3. Let $f(x) = -3x + 11$ and $g(x) = \dfrac{11 - x}{3}$. Show that f and g are inverses of each other.

4. Verify the identity: $\sin x \tan x = \sec x - \cos x$.

5. Solve the following equations:

(a) $\log_5(x) + \log_5(x + 10) = 2$

(b) $5e^x = 35$. (Write the answer in terms of logarithms, or round it to the nearest hundredth.)

6. Find the inverse of the function $f(x) = 4^{3x+8}$.

7. Let $g(x) = 3x^3 - 17x^2 + 22x - 8$.

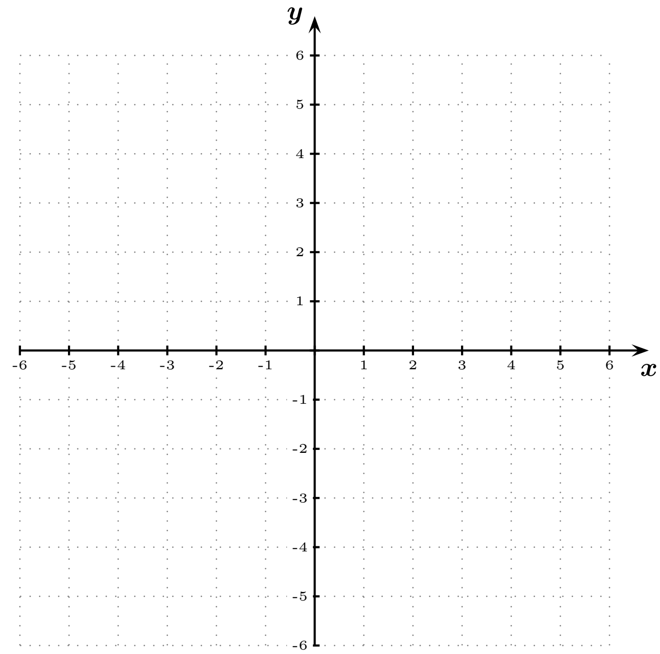
(a) List all possible rational roots of g, according to the Rational Zeros Theorem: ....

(b) Factor g completely: ....

(c) The x-intercepts of the graph of $y = g(x)$ are: ....

(d) The y-intercept of the graph of $y = g(x)$ is: ....

(e) Sketch the graph of $y = g(x)$ in the axes below.



8. Solve the inequality $\dfrac{(x-5)(x+4)}{(x-1)^2} \geq 0$.

9. For the rational function $f(x) = \dfrac{(x-5)(x+2)}{(x+4)(x-1)}$.

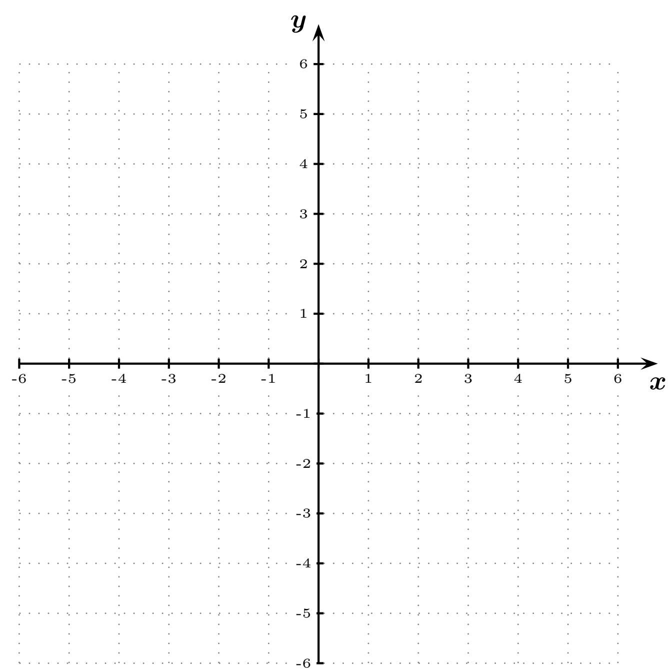
(a) Find the vertical asymptote(s): ....

(b) Find the x-intercept(s): ....

(c) Find the horizontal asymptote: ....

(d) Find the y-intercept(s): ....

(e) Sketch the graph of $y = f(x)$.



10. Evaluate the following expressions:

(a) $\log_8\left(\frac{1}{16}\right)$ (exact value) = ...

(b) If $\log_b x = 5$ and $\log_b y = -4$, then the exact value of $\log_b(xy)$ is ....

(c) $\log_7(18)$ (use your calculator and round to the nearest hundredth) = ...

(d) $\sin\left(\frac{9\pi}{4}\right)$ (exact value) = ...

(e) If $f(-10) = 7$, then $f^{-1}(7) =$ ....

(f) If the polynomial $p(x)$ is divided by $(x + 5)$, the remainder is 13. Therefore $p(-5) =$ ....

11. For the function $f(x) = 3\cos\left(2x - \frac{\pi}{2}\right)$,

(a) The period is: .... (b) The amplitude is: .... (c) The phase shift is: ....

(d) Sketch **one period** of the graph of $y = f(x)$ on the. **Be sure to indicate the scale for the x– and y–axes.**

12. Solve the following equations:

(a) $3\sin x = \sin x - 1$, where x is in the interval $[0, 2\pi)$.

(b) $\sin(3x) = \frac{\sqrt{3}}{2}$, where x is in the interval $[0, 2\pi)$.