Problem 1. Section 1.1 #14

Find the domain, range, and all zeroes/intercepts, if any, of the function $f(x) = \frac{x}{x^2-16}$.

- Domain: We need to ensure that the denominator is never zero; to find values that make the denominator zero, we solve the equation $x^2 - 16 = 0$ to get that the values $x = -4, 4$ are not in the domain. This means that our domain is $\boxed{\{x \mid x \neq -4, 4\}}$.
- Range: To find the range, we need to know all values of y such that $\frac{x}{x^2-16} = y$ has a solution. We can simplify this to $x = (x^2 - 16)y$, and we see that this equation has a solution for all y, so our range is $\boxed{\mathbb{R}}$.
- Zeroes: Solving the equation $\frac{x}{x^2-16} = 0$ gives us $\boxed{x = 0}$ as the only zero.
- Intercepts: We plug in $x = 0$ to get $f(0) = \frac{0}{0^2-16} = 0$, so $\boxed{y = 0}$ is our only y-intercept.

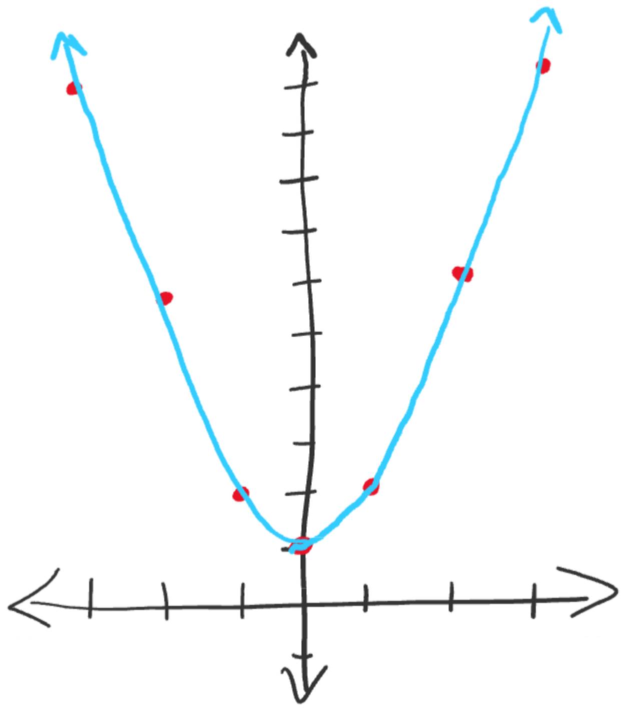
Problem 2. Section 1.1 #18

Find the domain, range, and all zeroes/intercepts, if any, of the function $f(x) = \frac{1}{\sqrt{x-9}}$.

- Domain: The square-root in the denominator is not defined when $x < 9$, and when $x = 9$, we have $1/0$, so our domain is $\boxed{(9, \infty)}$.
- Range: We want to know all values of y such that $\frac{1}{\sqrt{x-9}} = y$ has a solution. We can simplify to get $1 = y\sqrt{x-9}$, which has a solution as long as $y \neq 0$. Therefore, our range is $\boxed{\{y \mid y \neq 0\}}$.
- Zeroes: Solving the equation $\frac{1}{\sqrt{x-9}} = 0$ gives us $1 = 0$, which has no solutions, so the function has $\boxed{\text{no zeroes}}$.
- Intercepts: We plug in $x = 0$ to get $f(0) = \frac{1}{\sqrt{-9}}$, which is not defined, so the function has $\boxed{\text{no } y\text{-intercepts}}$ either.

Problem 3. Section 1.1 #22

Sketch the graph of the function $f(x) = x^2 + 1$.



Problem 4. Section 1.1 #28

Determine whether the graph represents a function. If it does, find . . .

The graph $\boxed{\text{does not represent a function}}$.

Problem 5. Section 1.1 #30

Determine whether the graph represents a function. If it does, find . . .

a. The domain is $\boxed{\mathbb{R}}$, and the range is $\boxed{(-\infty, 3)}$.

b. The x-intercepts are around $\boxed{0.25}$ and $\boxed{3.75}$.

c. The y-intercept is at $\boxed{-1}$.

d. The function is increasing on $\boxed{(-\infty, 2]}$.

e. The function is decreasing on $\boxed{[2, \infty)}$.

f. The function is constant on $\boxed{[2, 2]}$.

g. The function $\boxed{\text{does not have any special symmetry}}$.

h. The function is $\boxed{\text{neither even nor odd}}$.

Problem 6. Section 1.1 #32

Determine whether the graph represents a function. If it does, find ...

The graph $\boxed{\text{does not represent a function}}$.

Problem 7. Section 1.1 #52

A rental car company rents cars for a flat fee of $20 and an hourly charge of $10.25. Therefore, the total cost C to rent a car is a function of the hours t the car is rented plus the flat fee.

a. *Write the formula for the function that models this situation*

$\boxed{C(t) = 20 + 10.25t}$

b. *Find the total cost to rent a car for 2 days and 7 hours.*

2 days and 7 hours is $2 \cdot 24 + 7 = 55$ hours, and $C(55) = 20 + 10.25(55) = 583.75$, so the total cost is $\boxed{\$583.75}$.

c. *Determine how long the car was rented if the bill is $432.73.*

We need to solve the equation $C(t) = 432.73$:

$$\begin{aligned} 20 + 10.25t &= 432.73 \\ 10.25t &= 412.73 \\ t &= \frac{412.73}{10.25} \approx 40.27 \end{aligned}$$

So the car was rented for $\boxed{\text{about 40.27 hours}}$.