

Section 1.1 #15: Find the largest domain, the range, and all zeros and intercepts, if any of a function defined by the formula $f(x) = \sqrt{8x-1}$.

Solution: Firstly, square root functions are only defined (in this class...) when the stuff under the $\sqrt{\quad}$ symbol is ≥ 0 . This means the domain of f is the set of all numbers x such that $8x - 1 \geq 0$. Solve this inequality by adding 1 to both sides to get $8x \geq 1$ and now divide by 8 to get $x \geq \frac{1}{8}$. This means that the allowable values of x for this function are those x 's that are equal to or larger than $\frac{1}{8}$.

Section 1.1 #38: Find $f + g$, $f - g$, $f \cdot g$, and $\frac{f}{g}$ where $f(x) = 3x^2 + 4x + 1$ and $g(x) = x + 1$.

Solution: First compute $f + g$:

$$f(x) + g(x) = (3x^2 + 4x + 1) + (x + 1) = 3x^2 + 5x + 1.$$

Now compute $f - g$:

$$f(x) - g(x) = (3x^2 + 4x + 1) - \underbrace{(x + 1)}_{\text{distribute the minus!}} = 3x^2 + 4x + 1 - x - 1 = 3x^2 + 3x.$$

Now compute $f \cdot g$:

$$\begin{aligned} f(x) \cdot g(x) &= \underbrace{(3x^2 + 4x + 1)(x + 1)}_{\text{distribute!!}} \\ &= (3x^2 + 4x + 1)x + (3x^2 + 4x + 1)(1) \\ &= 3x^3 + 4x^2 + x + 3x^2 + 4x + 1 \\ &= 3x^3 + 7x^2 + 5x + 1 \end{aligned}$$

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.

Solution: $C(t) = 20 + 10.25t$, where t is measured in hours

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

Solution: Since t is measured in hours, we need to express 2 days and 7 hours in terms of hours alone. Since a day is 24 hours, 2 days is 48 hours and so 2 days and 7 hours is $48+7=55$ hours. Therefore the total cost to rent a car for 2 days and 7 hours is given by

$$C(55) = 20 + 10.25(55) = 583.75$$

(note: this is a pretty unrealistic cost!!)

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

Solution: We are seeking the number of hours t the car was rented if the cost $C(t) = 432.73$. Therefore we are being asked to solve the equation $432.73 = 20 + 10.25t$. To solve it, subtract 20 to get $412.73 = 10.25t$ and divide by 10.25 to get $t = \frac{432.73}{10.25} \approx 42.22$ hours.