(Section 5-7) Extras

Name:

Average rate of change

1. What is the average rate of change in the function $f(x) = .2x^2 - 1$ from x = 1 to x = 6?

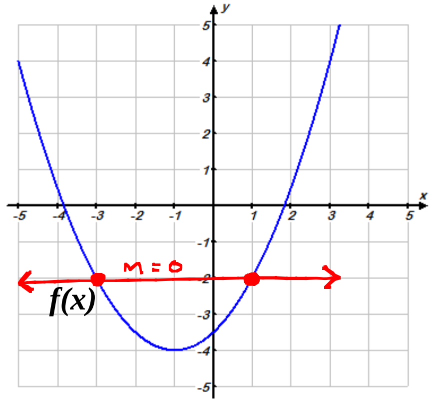
$(1, -0.8)$ $(6, 6.2)$

$f(1) = .2(1)^2 - 1 = .2 - 1 = -.8$

$f(6) = .2(6)^2 - 1 = .2(36) - 1 = 7.2 - 1 = 6.2$

$M = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6.2 - -0.8}{6 - 1} = \frac{7}{5} = \boxed{1.4}$

2. Given the following graph of the function *f(x)* determine the average change in the function from x = – 3 to x = 1?



$\boxed{0}$

3. A person was driving to the beach in Florida from Atlanta. The trip took roughly 5.3 hours and they traveled a total distance of 370 miles. They mainly drove on an interstate that had a speed limit of 70 mph.

   a. What was their average rate of speed?

$\frac{\text{CHANGE IN DISTANCE}}{\text{CHANGE IN TIME}} = \frac{\text{370 MILES}}{\text{5.3 HOURS}} \approx 69.8 \text{ MPH}$

$\boxed{\approx 69.8 \text{ MPH}}$

   b. Do you think they ever traveled over the speed limit? Explain your reasoning.

MOST LIKELY, IF WE ASSUME THAT AT SOME POINT ON THE TRIP THE PERSON HAD TO STOP FOR GAS OR GET OFF THE INTERSTATE THEN THERE WERE TIMES THE PERSON WAS GOING SUBSTANTIALLY LESS THAN 69.8 MPH & PROBABLY HAD TO GO OVER 70 MPH TO GET THE AVERAGE BACK UP TO 69.8 MPH.

4. The function $s(t) = \frac{25t\sqrt{0.04t^2 + 1}}{.02t^3 + 0.5}$ represents the speed of a train t – hours after it left the station at 12:00 pm.

   a. What is the average ~~speed~~ acceleration of the train over the first 2 hours of its trip?

$(0, 0 \text{ MPH}) \approx (2, 81.6 \text{ MPH})$

$f(0) = 0 \text{ MPH}$

$f(2) \approx 81.6 \text{ MPH}$

$a = \frac{81.6 - 0}{2 - 0} = \frac{81.6 \text{ MPH}}{2 \text{ H}} = 40.8 \frac{\text{MILES}}{\text{HOUR}^2}$

$\approx .0005$ g's

$\boxed{\approx 40.8 \frac{\text{MPH}}{\text{H}}}$

   b. What is the average ~~speed~~ acceleration of the train from 3 pm to 6 pm?

$(3, 84.1 \text{ MPH})$ $(6, 48.6 \text{ MPH})$

$f(3) = 84.1$

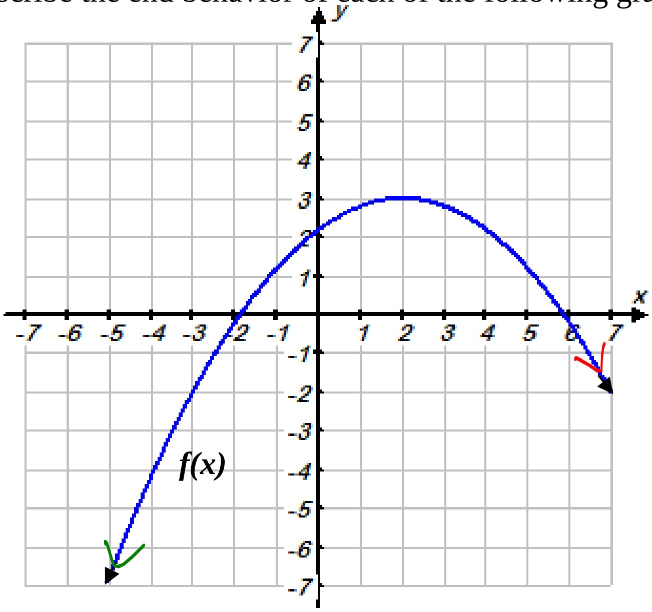
$f(6) = 48.6$

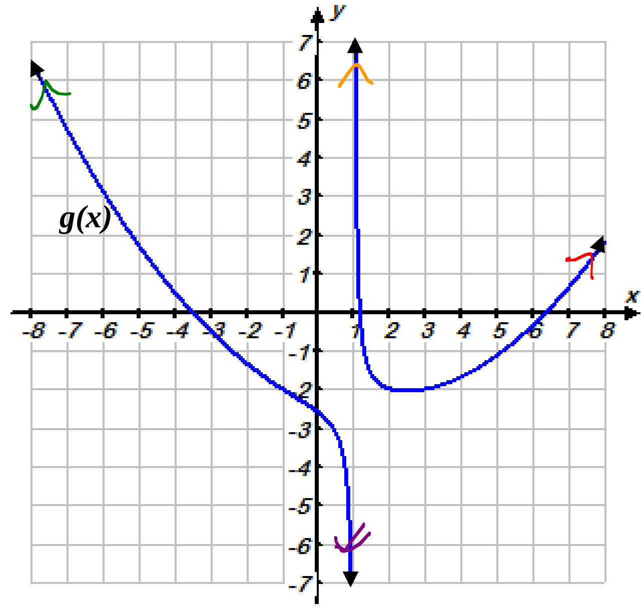
$a = \frac{48.6 - 84.1}{6 - 3} = -11.83 \frac{\text{MPH}}{\text{H}}$

$\boxed{\approx -11.8 \frac{\text{MPH}}{\text{H}}}$

End Behavior

Describe the end behavior of each of the following graphs.





As x→ ∞, *f(x)* → $-\infty$

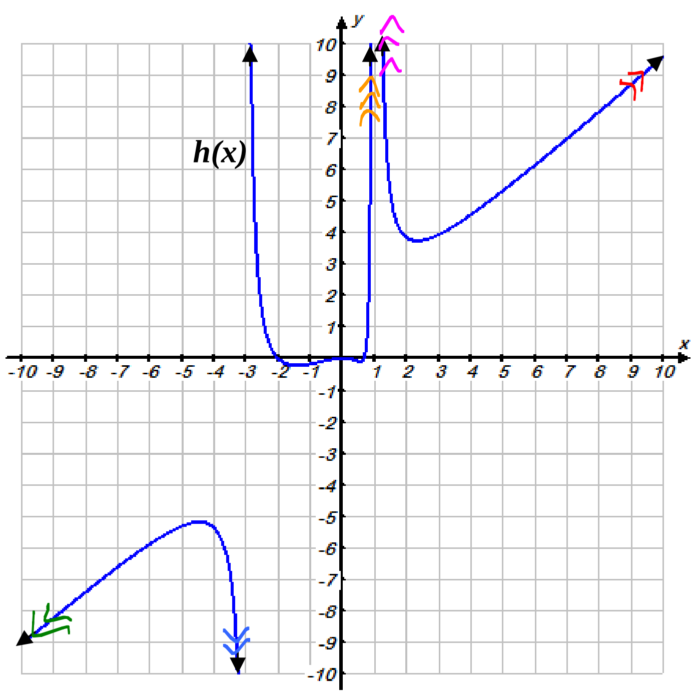
As x→ – ∞, *f(x)* → $-\infty$

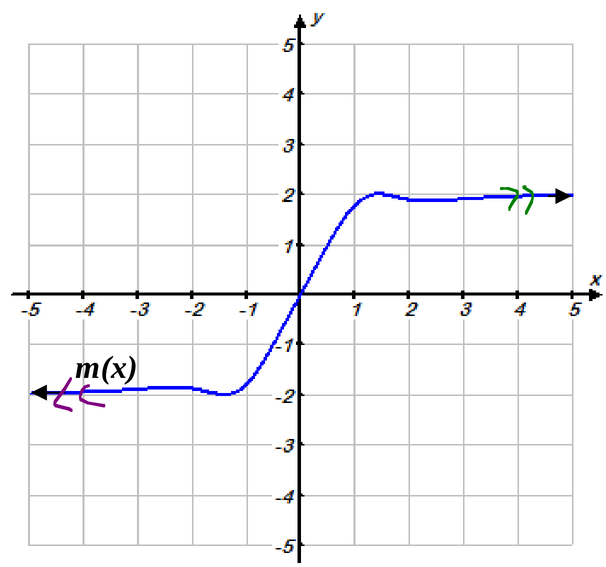
As x→ ∞, *g(x)* → ∞

As x→ – ∞, *g(x)* → ∞

As x→ 1^-, *g(x)* → $-\infty$

As x→ 1^+, *g(x)* → ∞





As x→ – ∞, *h(x)* → $-\infty$

As x→ ∞, *h(x)* → ∞

As x→ -3^-, *f(x)* → $-\infty$

As x→ 1^+, *f(x)* → ∞

As x→ 1^-, *f(x)* → ∞

As x→ – ∞, *g(x)* → -2

As x→ ∞, *g(x)* → 2

More Applications of Quadratics

1. The expression $-x^2+70x-600$ represents a company's profit for selling *x* items. For which number(s) of items sold is the company's profit equal to \$0?

$0=-x^2+70x-600$

$0=-(x^2-70x+600)$

$0=-(x-60)(x-10)$

$x=60 \quad x=10$

AT 10 OR 60 ITEMS THE MODEL SUGGEST THE COMPANY'S PROFIT IS \$0.

2. Given the expression s^2 is used to calculate the area of a square, where *s* is the side length of the square. What does the expression $(8x)^2$?

BASED ON THE FIRST EXPRESSION, THE SECOND EXPRESSION $(8x)^2$ COULD REPRESENT THE AREA OF A SQUARE WITH SIDES OF LENGTH $8x$.

Literal equations

1. Solve the equation $SA=4\pi r^2$ for r.

$\frac{SA}{4\pi}=\frac{4\pi r^2}{4\pi}$

$\pm\sqrt{\frac{SA}{4\pi}}=\sqrt{r^2}$

SINCE "r" IS A LENGTH ONLY THE POSITIVE SQUARE ROOT IS CONSIDERED

$\boxed{\sqrt{\frac{SA}{4\pi}}=r}$

2. Solve the equation $SA=2\pi r^2+2\pi rh$ for h.

$-2\pi r^2 \quad -2\pi r^2$

$\frac{SA-2\pi r^2}{2\pi r}=\frac{2\pi rh}{2\pi r}$

$\boxed{\frac{SA-2\pi r^2}{2\pi r}=h}$

3. Solve the equation $SA=2lw+2lh+2hw$ for w.

$-2lh \quad -2lh$

$SA-2lh=2lw+2hw$

$\frac{SA-2lh}{2l+2h}=\frac{w(2l+2h)}{2l+2h}$

$\boxed{\frac{SA-2lh}{2l+2h}=w}$

4. Solve the equation $h=-16t^2+48$ for t.

$-48 \quad -48$

$\frac{h-48}{-16}=\frac{-16t^2}{-16}$

$\pm\sqrt{\frac{h-48}{-16}}=\sqrt{t^2}$

$\boxed{\pm\sqrt{\frac{h-48}{-16}}=t}$