Chapter 1: Review
Section 1: Functions
page 15: 1, 3, 5, 7, 19, 25

Section 2: Operations on Functions
page 27: 1, 5, 9, 21, 27, 29, 33, 51

Section 3: Linear Functions
page 40: 1, 3, 13, 17, 29, 31

Section 4: Exponents
page 45: 1, 7, 13, 17, 23

Section 5: Quadratics
page 49: 1, 7, 11, 13

Section 6: Polynomials and Rational Functions
page 58: 1, 3, 13, 15, 19, 23, 27

Section 7: Exponential Functions
page 66: 1, 3, 5

Section 8: Logarithmic Functions
page 72: 1, 3, 5, 7, 9, 13, 21, 27, 31

1.4 Exercises

Simplify each expression

1. $x^3 x^5$ $= x \wedge 3 \; x \wedge 5$

$= x^{3+5} = \boxed{x^8}$ $\quad x \wedge 8$

$a^m \cdot a^n = a^{m+n}$

6. $\left(5x^4\right)^2 x^5$

$= 5(x^4)^2 x^5$

$= 25(x^4)^2 x^5$

$= 25 x^8 x^5$

$= 25 x^{8+5}$

$= \boxed{25 x^{13}}$

Simplify, and rewrite without negative exponents

11. $x^{-4}x^2$

$\left(\frac{1}{x^4}\right)\left(x^2\right) = \frac{x^2}{x^4} = x^{2-4} = x^{-2} = \boxed{\frac{1}{x^2}}$

$\downarrow$

$\boxed{\frac{1}{x^2}}$

$\left(\frac{1}{x}\right)^2 = \left(\frac{1}{x}\right)\left(\frac{1}{x}\right)$

$= \frac{(1)(1)}{(x)(x)} = \frac{1}{x^2}$

Rewrite using negative or fractional exponents

19. $\frac{4}{\sqrt[3]{x}}$

$4\left(x^{-\frac{1}{3}}\right)$

$4x^{-\frac{1}{3}}$

wrong $(4x)^{-\frac{1}{3}} = 4^{-\frac{1}{3}} x^{-\frac{1}{3}} = \frac{1}{\sqrt[3]{4}} \frac{1}{\sqrt[3]{x}} = \frac{1}{\sqrt[3]{4x}}$

1.5

Forms of Quadratic Functions

The **standard form** of a quadratic function is $f(x) = ax^2 + bx + c$

The **transformation form** of a quadratic function is $f(x) = a(x-h)^2 + k$

The **vertex** of the quadratic function is located at (h, k), where h and k are the numbers in the transformation form of the function. Because the vertex appears in the transformation form, it is often called the **vertex form**.

x = variable

a, b, c = constants

Let $f(x) = 2x^2 + 4x + 5$

convert to vertex form by completing the square

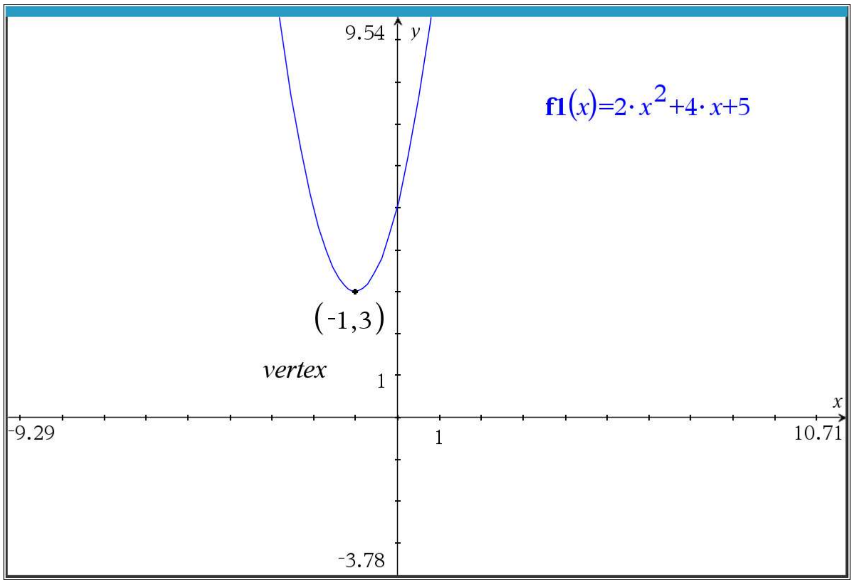
$$f(x) = (2x^2 + 4x) + 5$$
$$= 2(x^2 + 2x) + 5$$
$$= 2(x^2 + 2x + 1 - 1) + 5$$
$$= 2(x^2 + 2x + 1) - 1(2) + 5$$

$$\left(\frac{1}{2}\right)(2) = 1$$
$$1^2 = 1$$

$$\boxed{f(x) = 2(x+1)^2 + 3}$$

$$= 2(x-(-1))^2 + 3$$

vertex $(h,k) = (-1,3)$



$f(x) = x^6 - 3x^4 + 2x^2$. Factor f(x)

$f(x) = x^2(x^4 - 3x^2 + 2)$

Let $y = x^2$

$\Rightarrow x^4 - 3x^2 + 2$

$= (x^2)^2 - 3(x^2) + 2$

$= y^2 - 3y + 2$

$= (y - 2)(y - 1)$

$f(x) = x^2(x^2 - 2)(x^2 - 1)$

$= x(x + \sqrt{2})(x - \sqrt{2})(x + 1)(x - 1)$

zero of $f(x)$ are $x = 0, \pm\sqrt{2}, \pm 1$

Geometrically these are the x-intercepts of

Geometrically these are the x-intercepts of the graph

Why can't we divide by zero?

Assume $\frac{1}{0} = x$ for some real number x

$\Rightarrow 1 = 0 \cdot x$

$1 = 0$

$1 + 1 = 0 + 1$

$2 = 1 = 0$

$2 + 1 = 1 + 1 = 0 + 1 = 0$

$3 = 0$

$\vdots$

$1,000,000 = 0$

TI-Nspire check

$\frac{1}{0}$	undef