



And now, as  $x$  gets very large (or very negative) we know those  $\frac{a}{x}$  and  $\frac{a}{x^2}$  terms dwindle towards zero, so for huge values of  $x$ ,

$$f(x) \approx \frac{2 + 0 - 0}{6 + 0 - 0} = \frac{1}{3}$$

And so the horizontal asymptote — what  $f(x)$  approaches as  $x$  becomes extremely large in either the positive or negative direction — is  $\frac{1}{3}$ .

4. **(3 points)** *Evaluate the following exponential functions at the given values. Write your final answer as a number without exponents.*

(a) *If  $f(x) = 2^{x+1}$ , calculate  $f(3)$ .*

$$f(3) = 2^{3+1} = 2^4 = 16.$$

(b) *If  $g(x) = \left(\frac{2}{3}\right)^{6-3x}$ , calculate  $g(2)$ .*

$$g(2) = \left(\frac{2}{3}\right)^{6-3 \cdot 2} = \left(\frac{2}{3}\right)^0 = 1.$$

(c) *If  $h(x) = 16^{x-2}$ , calculate  $h\left(\frac{7}{2}\right)$ .*

$$h\left(\frac{7}{2}\right) = 16^{7/2-2} = 16^{3/2} = (16^{1/2})^3 = (\sqrt{16})^3 = 4^3 = 64.$$