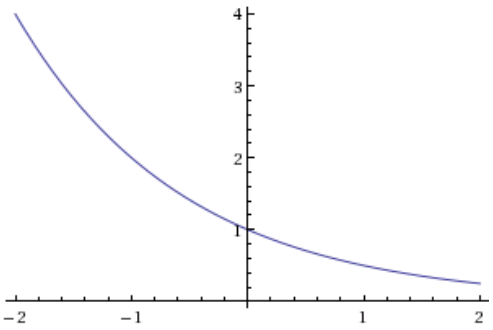
4.2 Solutions to Exercises

1. b 3. a 5. e

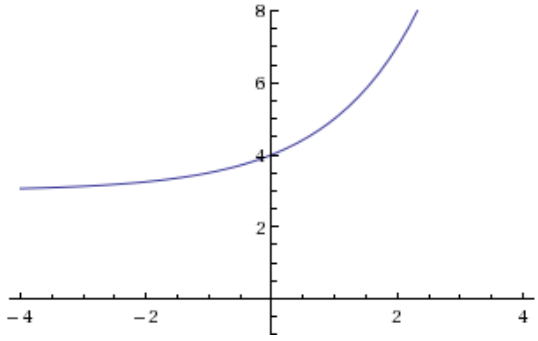
7. The value of b affects the steepness of the slope, and graph D has the highest positive slope it has the largest value for b.

9. The value of a is your initial value, when your $x = 0$. Graph C has the largest value for a.

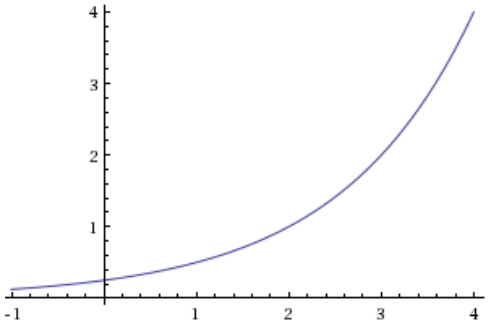
11. The function changes x to $-x$, which will reflect the graph across the y-axis.



13. The function will shift the function three units up.



15. The function will shift the function two units to the right.



17. $f(x) = 4^x + 4$ 19. $f(x) = 4^{(x+2)}$ 21. $f(x) = -4^x$

23. as $x \to \infty, f(x) \to -\infty$. When x is approaching $+\infty$, $f(x)$ becomes negative because 4^x is multiplied by a negative number.

as $x \to -\infty, f(x) = -1$. As x approaches$-\infty$, $f(x)$ approaches 1, because $-5(4^{-x})$ will approach 0, which means $f(x)$ approaches -1 as it's shifted down one.

25. as $x \to \infty$, $f(x) \to -2$ As x approaches $+\infty$, $f(x)$ approaches -2, because $3\left(\frac{1}{2}\right)^x$ will approach 0, which means $f(x)$ approaches -2 as it's shifted down 2.

as $x \to -\infty$, $f(x) \to +\infty$ because $\left(\frac{1}{2}\right)^{-x} = (2)^x$ so $f(x) \to \infty$.

27. as $x \to \infty$, $f(x) \to 2$ As x approaches $+\infty$, $f(x)$ approaches 2, because $3(4)^{-x}$ will approach 0, which means $f(x)$ approaches 2 as it's shifted up 2.

as $x \to -\infty$, $f(x) \to \infty$ because $(4)^{-x} = \left(\frac{1}{4}\right)^x$ so $f(x) \to \infty$.

29. $f(x) = -2^{x+2} + 1$ flipped about the x-axis, horizontal shift 2 units to the left, vertical shift 1 unit up

31. $f(x) = -2^{-x} + 2$ flipped about the x-axis, flipped about the y-axis, vertical shift 2 units up

33. $f(x) = -2(3)^x + 7$ The form of an exponential function is $y = ab^x + c$. This equation has a horizontal asymptote at $x = 7$ so we know $c = 7$, you can also now solve for a and b by choosing two other points on the graph, in this case (0,5) an (1,1), you can then plug (0,5) into your general equation and solve for a algebraically, and then use your second point to solve for b.

35. $f(x) = 2\left(\frac{1}{2}\right)^x - 4$ The form of an exponential function is $y = ab^x + c$. This equation has a horizontal asymptote at $x = -4$ so we know $c = -4$, you can also now solve for a and b by choosing two other points on the graph, in this case (0,-2) an (-1,0), you can then plug (0,-2) into your general equation and solve for a algebraically, and then use your second point to solve for b.