1.2 and 1.3 Functions, Graphs, and Exponential Functions

Compositions

$f \circ g = f(g(x))$ → The domain is the intersection of the domain of $g(x)$ and the domain of simplified $f(g(x))$

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Rules for Exponents

$a^x a^y = a^{x+y}$ $\quad \frac{a^x}{a^y} = a^{x-y}$ $\quad (a^x)^y = a^{xy}$ $\quad a^x b^x = (ab)^x$ $\quad \left(\frac{a}{b}\right)^x = \frac{a^x}{b^x}$

Growth and Decay Equation

$y = k a^x$

Half – Life

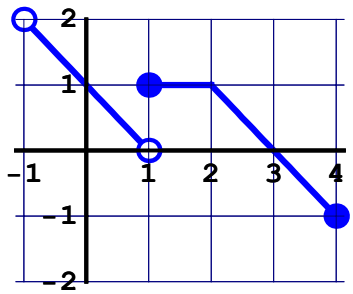
$y = k\left(\left(\frac{1}{2}\right)^{\frac{t}{life}}\right) = k\left((2)^{\frac{-t}{life}}\right)$ where k is the initial value

Compound Interest

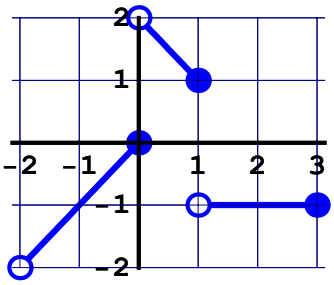
Compounded n times per year → $y = A\left(1 + \frac{k}{n}\right)^{tn}$ A is initial value, k is the rate

Compounded continuously → $y = Ae^{kt}$ A is initial value, k is the rate

1. Write a piecewise formula for the following function.



2. Write a piecewise formula for the following function.



3. Find $f(g(x))$ and $g(f(x))$ and their domain and range if $f(x) = \sqrt{x+3}$ and $g(x) = x^2 - 5$

4. Find $f(g(x))$ and $g(f(x))$ and their domain and range if $f(x) = \dfrac{x-1}{x}$ and $g(x) = \dfrac{2x+1}{2-x}$

5. Use your calculator to help you determine the domain and range of the function $y = \dfrac{2}{\sqrt[3]{4-x^2}}$

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6. Graph $y = -\left(\dfrac{1}{2}\right)^x + 3$

7. Graph $y = -e^x - 1$

8. Change the bases: (a) 27^{2x}, base 3 (b) $\left(\dfrac{1}{16}\right)^{\frac{x}{2}}$, base 2

9. Solve $e^{-x} - 4 = 0$

10. The population of Cupertino was 800 in the year 1880. Assume that the population increased at the rate of 4% a year (a) Estimate the population in 1920 (b) When did the population reach 10, 000?

11. The half – life of the radioactive isotope Calculusium is 8 days. There are 36 grams present initially. When will there be 5 grams remaining?

12. Determine how much time is required to double your investment if interest is earned at the rate of 7.25% compounded continuously.