

2.6 Inequalities



2.44

2.51

2.54

Ex1 (Linear Inequality)

Solve $4(2-3x) - 20x \leq 4 - 2(3+4x)$

Ex2 (Absolute Value inequality)

Solve $-3x + |2x+3| < 4-2x$

2.6 (cont)

Ex3 (Polynomial Inequality) Solve.

(a) $(2x-3)(x+10) < 0$

(d) $2x^2 + 4 \leq 9x$

(b) $(2x-3)^2(x+10) < 0$

(c) $(2x-3)(x+10)^2 < 0$

2.6 (cont)

Ex 4 Solve (Rational Inequality).

(a) $\frac{2x^2-3}{9-x^2} \leq 1$

(b) $\frac{1}{x+2} \geq \frac{6}{1-x} - 2$

3.1 Exponential Fns

Additive Growth

vs.

ex every year, my mom adds \$100 to my bank account.

$$f(t+1) = f(t) + 100$$

3.1

Generically, for additive growth $f(t+1) = f(t) + m$,
m = constant given $f(0)$

direct formulas:

$$f(t) = mt + f(0)$$

Ex 1 f has multiplicative growth w/ factor 5.
Find $f(4)$ if $f(0) = 2$

Multiplicative Growth

ex every year, my boss gives me a 10% raise.

$$f(t+1) = 1.1 f(t)$$

3.2

Generically, for multiplicative growth $f(t+1) = b f(t)$, given $b = \text{constant}$ $f(0)$

recursive formulas

$$f(t) = f(0) b^t$$

exponential fn

Rules of Exponents

- ① $a^0 = 1, a \neq 0$
- ② $a^m a^n = a^{m+n}$
- ③ $\frac{a^m}{a^n} = a^{m-n}$
- ④ $(a^m)^n = a^{mn}$
- ⑤ $a^m = \frac{1}{a^{-m}}$ (and $\frac{1}{a^{-m}} = a^m$)
- ⑥ $a^m b^m = (ab)^m$
- ⑦ $\frac{a^m}{b^m} = \left(\frac{a}{b}\right)^m$

3.1 (cont)

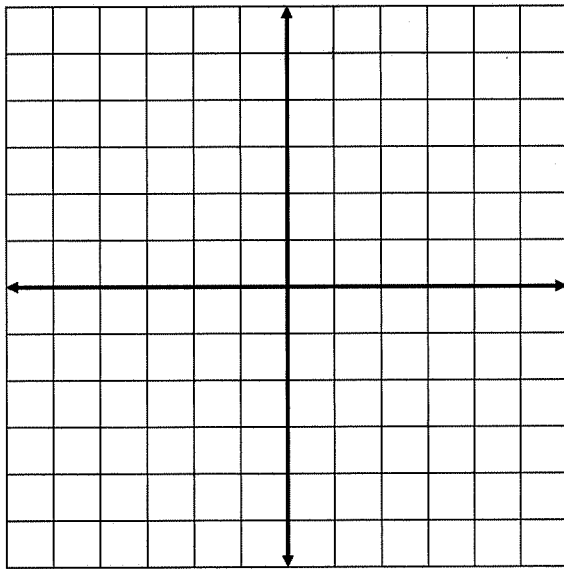
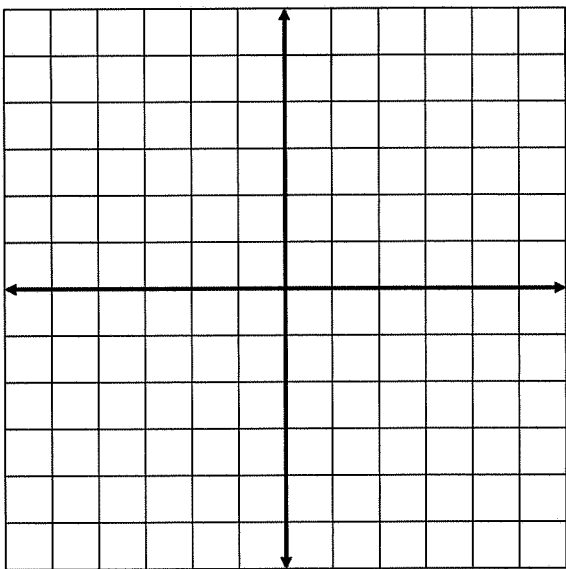
Ex2 A \$20,000 car depreciates in value by 4% per year. Find a fn $f(t)$ giving the value of the car at year $t \geq 0$.

Exponential Fn $f(x) = b^x$ $b \in \mathbb{R}, b > 0, b \neq 1$

(b is called the base)

domain: $x \in \mathbb{R}$, range: $y > 0$

Ex3 Graph $y = 2^x$ and $y = \left(\frac{1}{2}\right)^x$

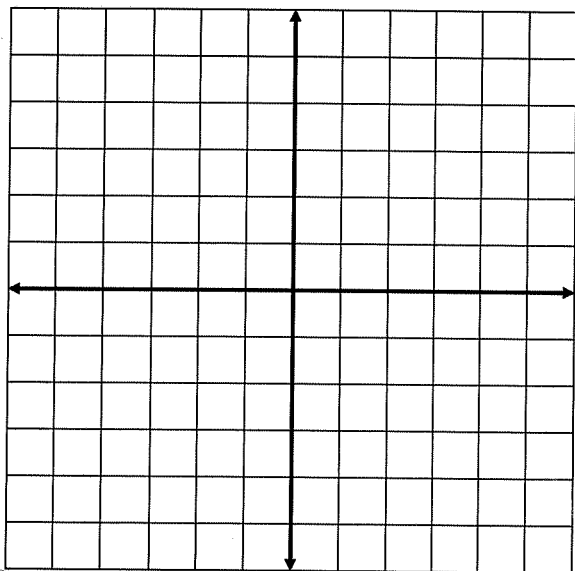


3.1 (cont)

Ex 4 Find a fn of the form $f(x) = C(b^x) + D$ such that $g(x) \rightarrow 3$ as $x \rightarrow \infty$, $g(1) = 5$, and $g(0) = 13$.

Ex 5 Graph these fns.

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



Natural Exponential

Fn

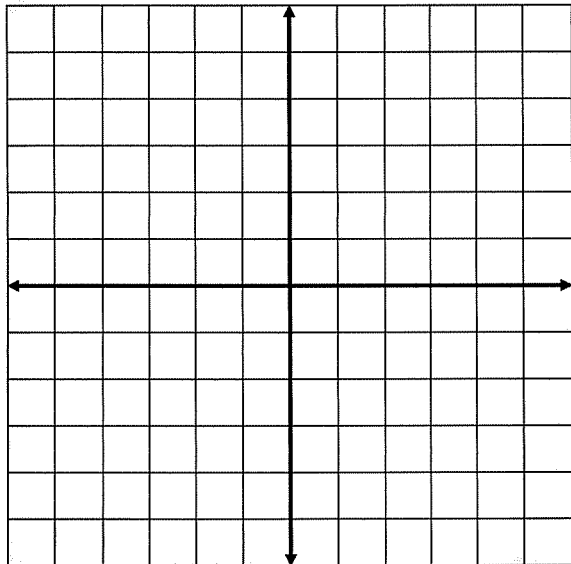
$$f(x) = e^x$$

$$e \approx 2.718$$

e is irrational

3.1 (cont)

Ex 5 (b) $y = -e^{x+1} + 2$



Compound Interest ① $f(t) = C \left(1 + \frac{r}{n}\right)^{nt}$

r = annual interest rate

n = # compoundings per year

t = # years ($t \geq 0$)

C = principal

② $f(t) = Ce^{rt}$ (for continuously compounded interest)

Ex 6 Suppose \$500 is deposited into an account earning 4% annual interest, compounded monthly. What is the balance in 5 years?