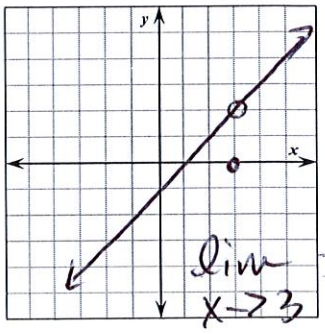
11.2 The Number *e*

1. An irrational number, symbolized by the letter *e*, appears as the base in many applied exponential functions. This irrational number is approximately equal to 2.72. More accurately, $e = 2.71828...$

$\lim_{x\to\infty} \left(1+\frac{1}{x}\right)^x$



$\lim_{x\to 3} f(x) = 2$

2. **Evaluate:**
   a. e b. e^3 c. e^{-2}

3. **Formulas for Compound Interest:** After t years, the balance A in an account with principal P and annual interest rate r (expressed as a decimal) is given by the following formulas.

For n compoundings per year: $A = P\left(1+\frac{r}{n}\right)^{nt}$ **For continuous compounding:** $A = Pe^{rt}$

# of times compounded / year

4. You invest \$500 in a savings account that pays 3.5% annual interest. How much will be in the account after five years?

$A = 500(1+.035)^5$ $n=1$

5. You invest \$500 in a savings account that pays 3.5% annual interest compounded semi-annually. How much will be in the account after five years?

$A = 500\left(1+\frac{.035}{2}\right)^{10}$

6. You invest \$500 in a savings account that pays 3.5% annual interest compounded quarterly. How much will be in the account after five years?

7. You invest \$500 in a savings account that pays 3.5% annual interest compounded monthly. How much will be in the account after five years?

$A = 500\left(1+\frac{.035}{12}\right)^{60}$

8. You invest \$500 in a savings account that pays 3.5% annual interest compounded daily. How much will be in the account after five years?

$A = 500\left(1+\frac{.035}{365}\right)^{1825}$

9. You invest \$500 in a savings account that pays 3.5% annual interest compounded continuously. How much will be in the account after five years?

$A = 500e^{.035\cdot 5}$

10. A population of insects is growing in such a way that the number in the population t days from now is given by the formula $P = 4000e^{0.02t}$, How large will the population be in one week?

$P = 4000e^{.02(7)}$

Homework: Page 612 #17-28 and Page 617 #12-17, 25-28, 32, 33