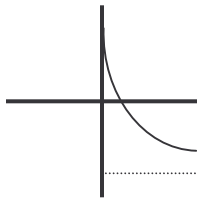


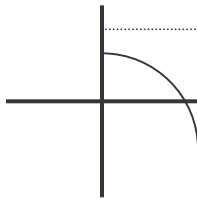
# Math 1160 - Section 11.3 Answer Key

1. Monotonic – a, b, d, f, h
2. Increasing – a, b, d
3. Unbounded – b, d, e, f
4. Constant - g
5. Repelled from  $y = b/(1-a)$  – b, d, e, f
6. Decreasing – f, h
7. Absolute value of  $a < 1$  – a, c, h
8.  $a < 0$  – c, e

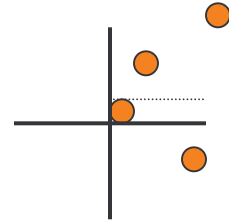
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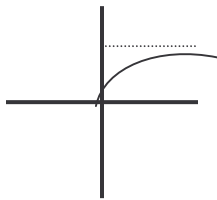
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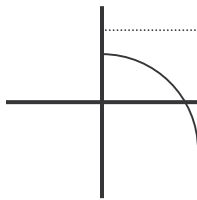
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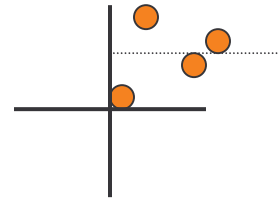
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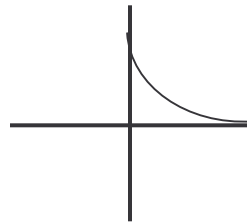
18.



20.



22.  $a = .98$  (monotonic, attracted to  $y = 0$ )  
 $y_0 = 10$  (initial value)



26. Solve  $b/(1-a)$  to get the maximum loan amount. The graph of a loan is monotonic (decreasing balance over time) and is repelled from the line (loan amount maximum).

Difference equation  $\rightarrow y_n = 1.02y_{n-1} - 100,000$      $a = 1.02$  and  $b = -100,000$

So  $b/(a-1) = -100,000/(1 - 1.02) = -100,000/-.02 = 5,000,000$

\*\*The loan amount must be less than \$5,000,000. If the loan amount is equal or greater than \$5,000,000, the loan will never get paid off because the interest due each compounding period will exceed the loan payment made.

29. The difference equation for this loan is:  $y_n = 1.05y_{n-1} - 1500$

The graph of these values is monotonic ( $a$  is positive) and repelled (absolute value of  $a$  is greater than 1). Therefore, the maximum that can be borrowed must be less than  $b/1-a$  so that the loan is eventually paid off.

$$b/1-a = -1500/(1 - 1.05) = -1500/-.05 = 30,000$$

She must borrow less than = \$30,000.

30. Difference Equation  $y_n = 1.01y_{n-1} - 120$   $y_0 = 10,000$

$$y_0 = 10,000$$

$$y_1 = 1.01(10,000) - 120 = \$9,980 \quad (\$20 \text{ applied to principal, } \$100 \text{ applied to interest})$$

$$y_2 = 1.01(9,980) - 120 = \$9,959.80 \quad (\$20.20 \text{ applied to principal, } \$99.80 \text{ applied to interest})$$

\*The difference in the loan balance from period to period shows how much of the \$120 payment was applied to the principal for that period. The remainder (\$120 payment – amount applied to principal) is for the interest (which is 1% of the beginning balance for that period).