

Exam 1 Review Sheet

I. Section 1.1 Lines and Linear Functions

A. Vocabulary

1. Ordered pair (page 2).
2. Slope of a line (page 3).
3. Slope-intercept form (page 6).

B. You may be asked to

1. Write the formula for a line given two points or a point and a slope.
2. Interpret the slope of a line in a word problem (Tip: use the units).
3. Identify when the slope of a line is positive, negative, zero or undefined from a graph. (See Figure 4 page 5).
4. Solve word problems involving linear models.

II. Models and Data

A. Vocabulary

1. Interpolate (page 75).
 - a. If you have a model $y=f(x)$, then to interpolate is to use the model to find the approximate y -value that corresponds to an x -value that lies within the domain of your data.
 - b. For example, if you have data for $x=1,2,3$ and 4, then to estimate the y -value at $x=1.5$ (which is between 1 and 4), you would calculate $f(1.5)$. This is interpolating.
2. Extrapolate (page 75).
 - a. If you have a model $y=f(x)$, then to extrapolate is to use the model to find the approximate y -value that corresponds to an x -value outside the domain of your data.
 - b. For example, if you have data for $x=1,2,3$ and 4, then to estimate the y -value for $x=9$ (which is outside the interval from 1 to 4), you would calculate $f(9)$. This is extrapolating.

B. You may be asked to

1. Identify or draw a graph showing data (points) and a model (a line or curve) that is accurate and/or one that is inaccurate.
2. Identify or give an example of interpolation or extrapolation.

III. Section 3.1 Limits at Infinity

A. You may be asked to

1. Determine the limit of a function $f(x)$ as x tends to positive or negative infinity by looking at a graph.
2. Determine the limit as x tends to positive or negative infinity of a rational function, i.e. one of the form
$$\frac{a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x^1 + a_0}{b_m x^m + b_{m-1} x^{m-1} + \dots + b_1 x^1 + b_0}.$$
 - a. Notice that if you get a nonzero number divided by 0, then the answer is infinity or minus infinity. To figure out which, plug in a large value of x , to see if you get a (large) positive value or negative value.
3. Determine the limit as x tends to positive or negative infinity of exponential functions, i.e. a function involving e^x .

IV. Section 3.3 Rates of Change

- A. Vocabulary
 - 1. Average rate of change of a function $f(x)$ between $x=a$ and $x=b$ (page 163).
 - 2. Instantaneous rate of change of a function $f(x)$ at a point $x=a$ (page 165).
- B. You may be asked to
 - 1. Calculate the average rate of change of a function $f(x)$ between $x=a$ and $x=b$ (numbers a and b and the formula for f would be given).
 - 2. Identify or draw the secant line on a graph whose slope is the average rate of change of the function $f(x)$ between $x=a$ and $x=b$.
 - 3. Calculate the instantaneous rate of change of a function $f(x)$ at the point $x=a$.
 - a. Algebraically for quadratic functions.
 - b. Numerically, using a table of values.
- V. Section 3.4 Definition of the derivative
 - A. Vocabulary
 - 1. Tangent line to a graph (page 173).
 - 2. The derivative of a function (and differentiate) (page 177).
 - B. You may be asked to
 - 1. Calculate derivatives. The point of these problems is to demonstrate your algebra skills. You must solve them using the methods of this section, even if you know more advanced techniques from calculus.
 - a. Quadratic functions (of the form ax^2+bx+c).
 - b. Reciprocal functions (of the form $c/(ax+b)$).
 - c. Functions with a square root (of the form $\sqrt{ax+b} + c$).
 - 2. Find the equation for the tangent line to the graph at a point.
 - 3. Draw or identify points on a graph at which the derivative does not exist.
 - 4. Answer questions showing you know the relationship between average and instantaneous rates of change of the function and the slopes of secant and tangent lines to the graph.
- VI. Section 3.5 Graphical Differentiation.
 - A. You may be asked to
 - 1. Identify intervals or points on a graph of the function at which the derivative of the function is positive, negative, zero or does not exist.
 - 2. Draw the graph of the derivative given the graph of the function.
- VII. Section 1.4 Quadratic functions.
 - 1. Vocabulary
 - a. Vertex (page 46).
 - b. Quadratic Equation (page 46).
 - 2. You may be asked to
 - a. Calculate the vertex and x - and y -intercepts of a quadratic function and use it to graph the function (see page 46).
 - 3. Solve a problem using the quadratic formula (in particular, you may have to use the quadratic formula to find the x -intercepts of the graph).