MAT 136 (Calculus I), Prof. Jim Swift
Worksheet 4 = Quiz 1, Linear and Piecewise Defined Functions

Name: key

There are 2 problems, one on each side of the page. The problems have equal weight.

You may use your notes, and work with other people, but you may not use a calculator, etc.

The quiz is worth 5 class points. Missing the quiz gets 0 points, and taking the quiz in class (or with a make-up for an excused absence) gets at least 1 point.

1. A linear function f satisfies $f(5) = 4$ and $f(6) = 7$. Fill in the blanks with numbers.

(a) Write a formula for $f(x)$ using the point-slope form: $f(x) = \underline{3}(x - 5) + \underline{4}$

Note: $f(5) = 3(5-5)+4 = 0+4 = 4$ ✓

(b) Write the formula for $f(x)$ using the slope-intercept form: $f(x) = \underline{3}\,x + \underline{-11}$.

$m = \frac{\Delta y}{\Delta x} = \frac{7-4}{6-5} = \frac{3}{1} = 3$

$\boxed{m=3}$

$f(5)=4$, so $\boxed{(x_0, y_0) = (5,4)}$ is a point on the line.

$y - y_0 = m(x - x_0)$

$y - 4 = 3(x-5)$

$y = 3(x-5)+4$

So $\boxed{f(x) = 3(x-5)+4}$

Or, use $f(0)=b$ with first form:

$f(0) = 3(0-5)+4 = -15+4 = -11 = b$.

Expand to get "b"

$f(x) = 3x + (3)(-5) + 4 = 3x - 15 + 4$

$\boxed{f(x) = 3x - 11}$ So $\boxed{b = -11}$

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Showing minimum work. Name: key

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(a) Write a formula for $f(x)$ using the point-slope form: $f(x) = \underline{3}(x - 5) + \underline{4}$

$m = \frac{7-4}{6-5} = \frac{3}{1} = 3$, and $f(5) = 4$, so ↗

(b) Write the formula for $f(x)$ using the slope-intercept form: $f(x) = \underline{3}x + \underline{-11}$.

$f(0) = 3(0-5)+4 = -15+4 = -11$, so $b = -11$

2. Consider the piecewise defined function

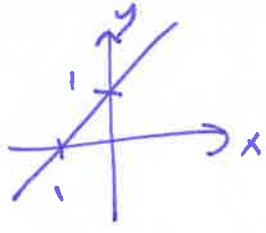
$$f(x) = \begin{cases} 1+x & \text{if } x \le 0 \\ x^2 & \text{if } x > 0 \end{cases}$$

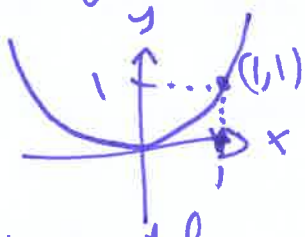
$f(-1) = 0$, $f(0) = 1$, $f(1) = 1$.

Fill in the blanks: $f(-1) = \underline{0}$, $f(0) = \underline{1}$, $f(1) = \underline{1}$.

Sketch graph $y = f(x)$ on the interval $-1 \le x \le 1$. As usual, draw a closed dot for a point on the graph, and an open dot for a point that is not on the graph.

Suggestion: Sketch $y = 1+x$ and $y = x^2$ first





horizontal slope at $x=0$