Ethan's Copy

Math 1A Worksheet #3

Name: _____

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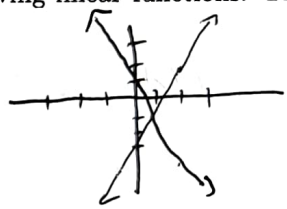
★1. Find the slope, y-intercept, and x-intercept for each of the following linear functions. Then sketch a graph containing both functions.

a) $f(x) = 2x - 3$. S: 2 y-int: -3

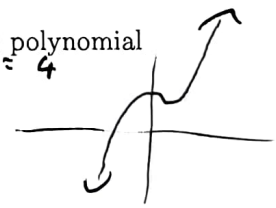
b) $f(x) = -3x + 1$. S: -3 y-int: +1



2. Consider the function

$$f(x) = x^3 - 2x^2 + x + 2. \quad = x^2(x-2) + x + 2$$

Find $f(-2)$, $f(0)$, $f(2)$. Then use these points as well as your knowledge about polynomial functions to sketch a graph of f. f(-2): -16 f(0) = 2 f(2) = 4



★3. Find the domain and range for each of the following functions:

a) $\sec(x)$. D: $\mathbb{R} \setminus \{ \pi/2 + k\cdot\pi \mid k \in \mathbb{Z} \}$ R: $(-\infty, -1) \cup (1, \infty)$

b) $f(x) = \dfrac{1}{1 + \sin(x)}$. D: $\mathbb{R} \setminus \{ \frac{3\pi}{2} + 2k\pi \mid k \in \mathbb{Z} \}$ R: $(1, \infty)$

c) $g(x) = e^x \tan(x)$ D: $\mathbb{R} \setminus \{ \pi/2 + k\cdot\pi \mid k \in \mathbb{Z} \}$ R: $(-\infty, \infty)$

4. Jason leaves Detroit at 2:00pm and drives at a constant speed west. He passes Ann Arbor, 40 mi from Detroit, at 2:50pm.

a) Express the distance traveled in terms of the time elapsed. 40 mi/50 min. = $\frac{4}{5}$ mpm. or 48 mph

b) What is the slope of this line? What does it represent?

Speed.

5. Many physical quantities are connected by inverse square laws, that is, by power functions of the form $f(x) = kx^{-2}$. In particular, the illumination of an object by a light source is inversely proportional to the square of the distance from the source. Suppose that after dark you are in a room with just one lamp and you are trying to read a book. The light is too dim and so you move halfway to the lamp. How much brighter is the light?

$\frac{k}{(\frac{1}{2}x)^2} = 4 \cdot \frac{k}{x^2}$ → 4 times brighter

6. Kepler's Third Law of Planetary Motion states that "The square of the period of revolution of a planet is proportional to the cube of its mean distance from the sun." Write d as the mean distance from a planet to the sun. Write an equation for $T(d)$ that represents the period of revolution of the planet.

$T(d)^2 = k \cdot d^3 \quad \Rightarrow \quad T(d) = \tilde{k} \cdot d^{3/2}$