

Exam 1 Math 1113 sec. 51 Fall 2018

Name: _____ *Solutions*

Your signature (required) confirms that you agree to practice academic honesty.

Signature: _____

Problem	Points
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total	

INSTRUCTIONS: There are 9 problems. The point values are listed with the problems. There are no notes, or books allowed and **no calculator is allowed. Illicit use of a calculator, smart phone, tablet, device that runs apps, or hand written notes will result in a grade of zero on this exam as well as a formal allegation of academic misconduct.** To receive full credit, answers must be clear, complete, and written using proper notation.

(1) (5 points) Find the equation of the line passing through the point $(-2, 4)$ having slope $m = 3$. Write your answer in slope intercept form ($y = mx + b$).

$$y - 4 = 3(x + 2) = 3x + 6$$

$$y = 3x + 10$$

(2) (12 points, 2 each) Let $f(x) = 3 - x^2$. Evaluate each of the following. Simplify where possible.

(a) $f(1) = 3 - 1 = 2$

(b) $f(-2) = -1$

(c) $f(\sqrt{3}) = 3 - 3 = 0$

(d) $f(a) = 3 - a^2$

(e) $f(2a) = 3 - 4a^2$

(f) $f(1 + h) = 3 - (1 + h)^2$

$$= 3 - (1 + 2h + h^2)$$
$$= 2 - 2h - h^2$$

(3) (12 points, 2 each) Let

$$f(x) = \frac{1}{x+1} \quad \text{and} \quad g(x) = 2x - 3.$$

Evaluate each of the following. Simplify where possible. In particular, your answers should not contain compound fractions (i.e. fractions with fractions in them).

(a) $(f + g)(1) = \frac{1}{2} - 1 = -\frac{1}{2}$

(b) $(fg)(0) = 1 \cdot (-3) = -3$

(c) $\left(\frac{f}{g}\right)(0) = \frac{\frac{1}{-3}}{-3} = -\frac{1}{3}$

(d) $(g - f)(2) = 1 - \frac{1}{3} = \frac{2}{3}$

(e) $(f \circ g)(0) = f(-3) = \frac{1}{2}$

(f) $(g \circ f)(0) = g(1) = -1$

$$f(1) = \frac{1}{2}$$

$$g(1) = -1$$

$$f(0) = 1$$

$$g(0) = -3$$

$$f(2) = \frac{1}{3}$$

$$g(2) = 1$$

(4) (5 points) Find the domain of the function $h(t) = \frac{\sqrt{t+2}}{t}$. Given your answer in interval notation using the appropriate symbols $[\]$, $(\)$.

We require $t+2 \geq 0$ and $t \neq 0$
 $t \geq -2$ and $t \neq 0$

The domain is $[-2, 0) \cup (0, \infty)$

(5) The function T given by $T(d) = 10d + 20$ can be used to determine the temperature T , in degrees Celsius, at a depth d kilometers inside the Earth.

(a) (3 points) Find $T(10)$. Give your answer with appropriate units.

$$T(10) = 10(10) + 20 = 120$$

$$T(10) = 120 \text{ }^\circ\text{C}$$

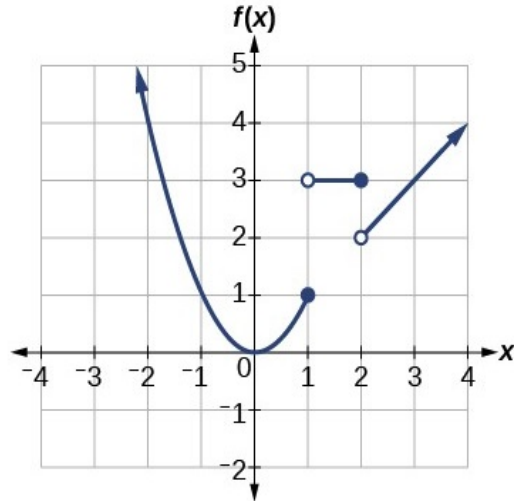
(b) (3 points) Determine the depth at which the temperature is 50°C ; include units in your answer.

Solve $T(d) = 50$

$$10d + 20 = 50 \Rightarrow 10d = 30 \quad d = 3$$

The depth is 3 km

(6) (16 points, 2 each) The figure shows the plot of $y = f(x)$.



Respond to the following based on the figure.

(a) Evaluate $f(-1)$ $= 1$

(b) On the interval $(-2, 0)$ f is (circle one) **Increasing** **Decreasing** **Constant**

(c) Evaluate $f(3)$ $= 3$

(d) Find all a such that $f(a) = 1$. $a = 1$ or $a = -1$

(e) On the interval $(1, 2)$ f is (circle one) **Increasing** **Decreasing** **Constant**

(f) The equation $f(x) = 2$ has (circle one) **no solutions** **one solution** **two solutions**.

(g) Which of the following is NOT a point on the graph (circle one) $(0, 0)$ $(1, 3)$ $(2, 3)$.

(h) Evaluate $f(f(-1))$. (Note that this is “ f of f of -1 .”) $f(f(-1)) = f(1) = 1$

(7) (5 points) Find the value of k such that the line containing the points $(k, 1)$ and $(3, -2)$ is parallel to the line $4x - 2y = 5$.

$$\begin{aligned} -2y &= -4x + 5 \Rightarrow y = 2x - \frac{5}{2} \\ \text{let } m &= \frac{-2-1}{3-k} . \text{ Then } m=2 \Rightarrow 2 = \frac{-2-1}{3-k} = \frac{-3}{3-k} \\ 2(3-k) &= -3 \Rightarrow 6-2k = -3 \quad -2k = -9 \\ k &= \frac{9}{2} \end{aligned}$$

(8) (16 points, 2 each) Suppose we have a function $f(x)$. Match the action on the graph with the transformation shown in the column on the right.

A: shift 3 units to the right	<u> H </u>	$f(3x)$
B: shift 3 units down	<u> G </u>	$f(-x)$
C: reflection in the x -axis	<u> D </u>	$3f(x)$
D: stretch in the vertical direction	<u> B </u>	$f(x) - 3$
E: shift 3 units to the left	<u> A </u>	$f(x - 3)$
F: shift 3 units up	<u> F </u>	$f(x) + 3$
G: reflection in the y -axis	<u> C </u>	$-f(x)$
H: shrink in the horizontal direction	<u> E </u>	$f(x + 3)$

(9) (8 points, 2 each) On the grids provided, plot each of the four functions using simple transformations applied to the graph of $y = |x|$. Clearly indicate which graph (a through d) is on each grid and label any intercepts. (The first plot (a) is not transformed on purpose.)

(a) $y = |x|$

(b) $y = |x - 4|$

(c) $y = -|x| + 2$

(d) $y = |x + 2| - 2$

