

Test #1 (Part 2 – Calculator Okay)

Math 18, Prof. Beydler

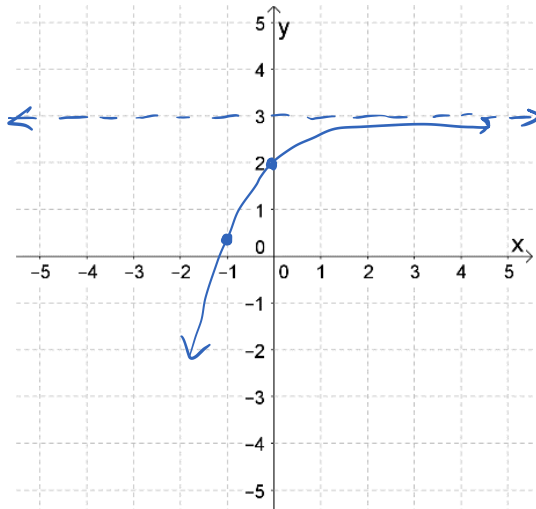
Name: _____

Monday, September 17, 2018

Directions: Show all work. No books or notes. A **scientific calculator** is allowed. Your desk and lap must be clear (no phones, no smart watches, etc.). If you have a phone in your lap or on your chair, it is considered cheating, and you will receive a zero on this test. Write your answers in the indicated places, or box your answers. Good luck!

1. Graph each function and find its domain and range.

a) (4 points) $f(x) = 3 - e^{-x}$

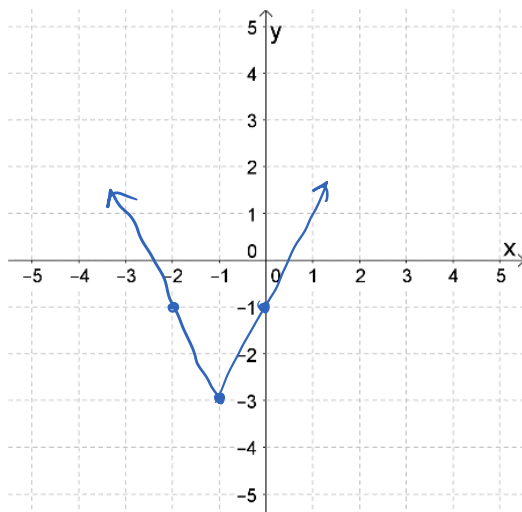


Reflect about y-axis
Reflect about x-axis
Shift up 3

Domain: $(-\infty, \infty)$

Range: $(-\infty, 3)$

b) (4 points) $h(x) = 2|x + 1| - 3$



Shift left 1
Stretch vertically by factor of 2
Shift down 3

Domain: $(-\infty, \infty)$

Range: $[-3, \infty)$

2. Given $g(x) = \begin{cases} \sqrt{-x} + 1, & x < 0 \\ 4, & x = 0 \\ x^2 - 2, & x > 0 \end{cases}$ answer the following.

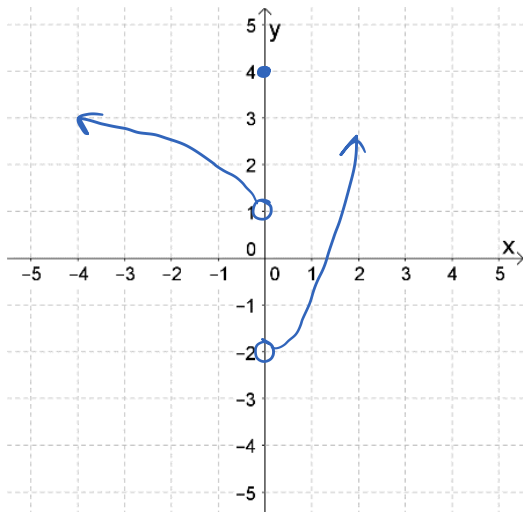
a) (1 point) $g(-1) = \underline{2}$

$\sqrt{-(-1)} + 1 = 1 + 1 = 2$

b) (1 point) $g(0) = \underline{4}$

c) (1 point) Find the domain of $g(x)$. $\underline{(-\infty, \infty)}$

d) (3 points) Graph $g(x)$.



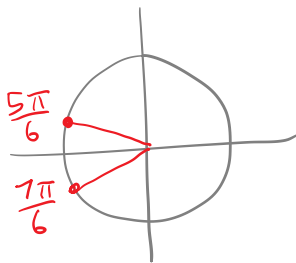
3. (4 points) Find all solutions to the following equation.

$$2 \cos 3x + \sqrt{3} = 0$$

Answer: $\underline{x = \frac{5\pi}{18} + \frac{2\pi}{3}k \quad \text{or} \quad x = \frac{7\pi}{18} + \frac{2\pi}{3}k}$

$2 \cos 3x = -\sqrt{3}$
 $\cos 3x = -\frac{\sqrt{3}}{2}$

ref $\frac{\pi}{6}$
 Q II, III



$$3x = \frac{5\pi}{6} + 2\pi k$$

$$3x = \frac{7\pi}{6} + 2\pi k$$

4. (2 points) Solve the following equation.

$$7 + 2 \log_2 x = 1$$

$$2 \log_2 x = -6$$

$$\log_2 x = -3$$

$$x = 2^{-3} = \frac{1}{2^3} = \frac{1}{8}$$

Answer: $\frac{1}{8}$

5. (3 points) Find the equation of the line in **slope-intercept form** through the following points.
(0, -2) and (-1, 3)

$$m = \frac{3 - (-2)}{-1 - 0} = -5$$

$$y - (-2) = -5(x - 0)$$

$$y + 2 = -5x$$

Equation in slope-intercept form: $y = -5x - 2$

6. (1 point) Below is a table that shows total number of students who drop given the number of corny jokes told in class. Find the average rate of change of the total number of students who drop as the number of corny jokes goes from 3 to 6. Write out your calculation and give units for your answer.

Corny jokes	Total students who drop
1	2
2	4
3	4
4	5
5	7
6	10

Source: I made it up again!

Answer: $2 \frac{\text{students}}{\text{corny joke}}$

$$\frac{10 - 4}{6 - 3} = \frac{6}{3} = 2$$

7. (2 points) Find the average rate of change of $f(x) = x^2 + x$ between $x = -1$ and $x = 2$.

$$\begin{aligned} \frac{f(2) - f(-1)}{2 - (-1)} &= \frac{2^2 + 2 - ((-1)^2 + (-1))}{3} \\ &= \frac{6 - 0}{3} \\ &= 2 \end{aligned}$$

Answer: 2

8. (4 points) Find the difference quotient $\frac{f(x+h)-f(x)}{h}$ of $f(x) = \frac{1}{x+2}$ and simplify by canceling the factor of h .

$$\begin{aligned} &\frac{\left(\frac{1}{x+h+2} - \frac{1}{x+2}\right) \cdot (x+h+2)(x+2)}{(h) \cdot (x+h+2)(x+2)} \\ &= \frac{\cancel{x+2} - (\cancel{x+h+2})}{h(x+h+2)(x+2)} \\ &= \frac{-h}{h(x+h+2)(x+2)} \end{aligned}$$

Answer: $\frac{-1}{(x+h+2)(x+2)}$