

Test: Review of Functions and Lines

**Academic Integrity:** I affirm that the work and answers on this test are my own and that I have upheld the highest standards of academic integrity.

Printed Name Key Signature \_\_\_\_\_

Provide a complete solution for each of the following items. Your solution should not only contain a correct answer and supporting work, but should also indicate your reasoning and employ correct notation. Make sure your work is done *neatly*!!

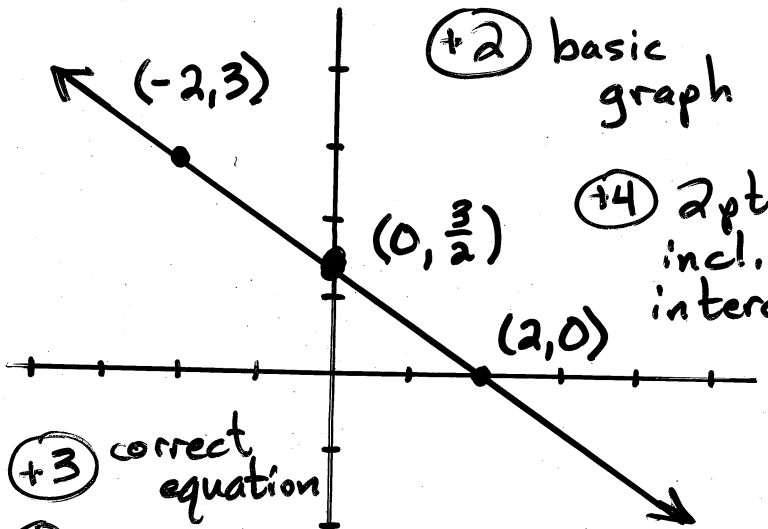
- 1) Write an equation for the line that passes through the point  $(-2, 3)$  and is perpendicular to the line given by the equation  $4x - 3y = 5$ . Then graph the resulting line. Be sure to clearly indicate the  $x$ - and  $y$ -intercepts on the graph.

slope:  $4x - 3y = 5$   
 $-3y = -4x + 5$   
 $y = \frac{4}{3}x - \frac{5}{3}$

(+2)

(+2) notation

$m_{\text{given}} = \frac{4}{3}$   
 $m_{\perp} = \frac{-1}{m_{\text{given}}} = -\frac{3}{4}$



(+2) basic graph

(+4) 2 pts incl. intercepts

(+2) using pt-slope form

line:  $y - 3 = -\frac{3}{4}(x + 2)$   
 $y = -\frac{3}{4}x + \frac{3}{2}$

(+3) correct equation

(+1) solving

x-int: let  $y = 0$   
 $0 = -\frac{3}{4}x + \frac{3}{2}$

- 2) Given  $f(x) = x^3 - x$  and  $g(x) = 15x$ , find the values of  $x$  for which  $f(x) = g(x)$ .

(+2) setup notation

solve  $f(x) = g(x)$   
 $x^3 - x = 15x$

(+3) setting = 0

$x^3 - 16x = 0$

(+4) Factor and Zero Product Principle

$x(x^2 - 16) = 0$

$x(x - 4)(x + 4) = 0$

$x = 0$     $x - 4 = 0$     $x + 4 = 0$   
 $x = 4$     $x = -4$

(+2) notation and x-int

$\frac{3}{4}x = \frac{3}{2}$   
 $x = 2$

(+2) solutions

(+1) answer

$f(x) = g(x)$  for  $x = -4, x = 0,$  and  $x = 4$

3) Evaluate  $h(-3)$ ,  $h(-1)$ , and  $h(-2-x^2)$  given that  $h(t) = \begin{cases} 3-5t, & t < -\frac{3}{2} \\ 4t^4 + 7, & t \geq -\frac{3}{2} \end{cases}$

(+1) notation (+1) correct formula (+2) answer  
 $h(-3) = 3 - 5(-3) = 3 + 15 = 18$

(+1) notation (+1) correct formula (+2) answer  
 $h(-1) = 4(-1)^4 + 7 = 4 + 7 = 11$

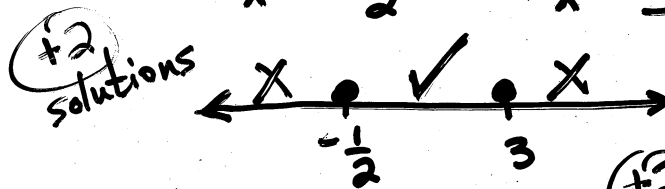
(+1) notation (+1) correct formula (+2) setup domain condition  
~~since~~ since  $-2 - x^2 \leq -2$ ,  
 (+1) notation (+2) correct formula (+2) simplify  
 $h(-2-x^2) = 3 - 5(-2-x^2) = 3 + 10 + 5x^2 = 5x^2 + 13$

4) Determine the domain of the function defined by  $h(x) = \frac{\sqrt{3+5x-2x^2}}{x-1}$

(+3)  
 $x-1 \neq 0$   
 $x \neq 1$

(+2) setup  
 $3+5x-2x^2 \geq 0$   
 consider  $3+5x-2x^2 = 0$  (+1) "consider"  
 $2x^2 - 5x - 3 = 0$

(+3) factored correctly  
 $(2x+1)(x-3) = 0$   
 $2x+1 = 0$      $x-3 = 0$   
 $x = -\frac{1}{2}$      $x = 3$

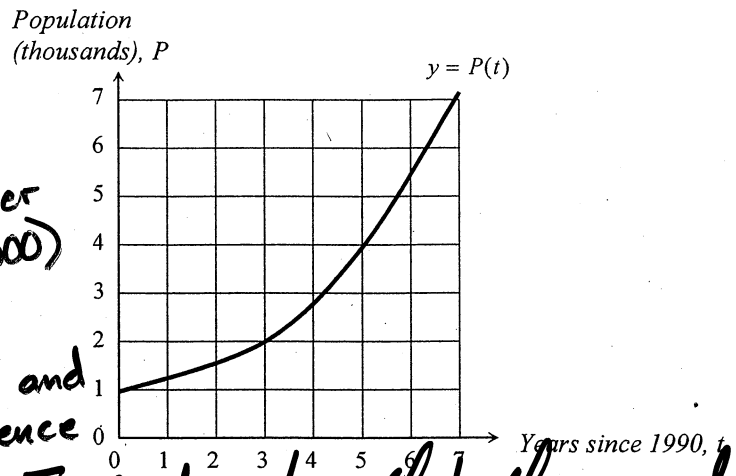


(+2) number line work

~~Dom~~  $Dom h = [-\frac{1}{2}, 1) \cup (1, 3]$

(+1) notation (+3) intervals (+2) [ or (

- 5) The population,  $P$  (in thousands), of Mathville  $t$  years after 1990 is represented by the graph shown, where  $y = P(t)$ . Approximate  $P(2)$ . Interpret your answer in the context of this application.



$P(2) \approx 1.5$  (+3) answer (no x/1000)

~~Population~~ (+1) setup and sentence

The statement  $P(2) \approx 1.5$  indicates that the population of Mathville in 1992 was about 1,500. (+2) answer (+2) interpret year

- 6) Your field research indicates that your test site contained 153 globemallow plants in 2001 and 237 globemallow plants in 2003.

- a) Assuming a linear relationship, write an equation for the number of globemallow plants as a function of the year.

let  $t = \#$  of years since 2000  
 $g = \#$  of globemallow plants

(+2) define variables

(+1) notation

slope:  $m = \frac{\Delta g}{\Delta t} = \frac{84}{2} = 42$  (+2) slope

plants:  $g - 153 = 42(t - 1)$  (+2) using pt-slope form

$g = 42t + 111$  (+3) solved for  $g$

- b) Interpret the slope of your equation in the context of this application.

The slope indicates that number of globemallow plants at the test site increases by 42 each year.

(+1) sentence clarity

(+1)

(+1)

- c) According to your linear model (equation), how many globemallow plants existed at the test site in 2005?

(+1) notation

let  $t = 5$

$g = 42(5) + 111 = 321$

(+3) answer

According to the linear model, 321 globemallow plants existed at the test site in 2005.

(+2) WP, WA