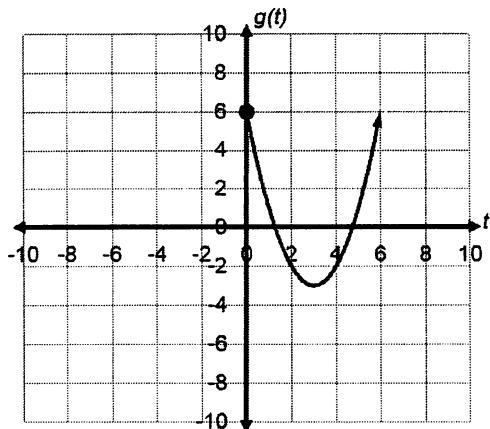


Math 80 Test 6 Practice test 1 Fall 2015

- 1) Given this is the graph of function $g(t)$.



- a) Estimate the domain of $g(t)$?

$$[0, \infty)$$

- b) Estimate the range of $g(t)$?

$$[-3, \infty)$$

- c) From the following functions use the one which best estimates $g(t)$ to finish the description of $g(t)$.

$$g(t) = -t^2 - 6t + 6$$

$$g(t) = t^2 - 6t - 6$$

$$g(t) = t^2 - 6t + 6$$

$$g(t) = \begin{cases} t^2 - 6t + 6 & 0 \leq t < \infty \end{cases}$$

- d) Find $g(k+1)$

$$(k+1)^2 - 6(k+1) + 6 = k^2 + 2k + 1 - 6k - 6 + 6$$

$$\boxed{k^2 - 4k + 1}$$

- e) Find $g(-2)$

Not possible -2 is outside of the domain.

$$LCD = 2t(2t+1)$$

2) Simplify $\frac{\frac{t}{2t+1} - t}{\frac{3}{2t}}$.

$$\frac{t(2t) - t(2t(2t+1))}{3(2t+1)} = \frac{2t^2 - t(4t^2 + 2t)}{3(2t+1)}$$

$$\frac{2t^2 - 4t^3 - 2t^2}{3(2t+1)} = \frac{-4t^3}{3(2t+1)}$$

3) Solve $\frac{3t}{t+2} + \frac{t+2}{2t} = \frac{1}{t}$.

$$LCD = 2t(t+2)$$

EXCLUDED $\{-2, 0\}$

$$3t(2t) + (t+2)(t+2) = 2(t+2)$$

$$6t^2 + t^2 + 4t + 4 = 2t + 4$$

$$7t^2 + 2t = 0$$

$$t(7t+2) = 0$$

$$\cancel{t \neq 0}$$

excluded

$$7t + 2 = 0 \quad \left\{ -\frac{2}{7} \right\}$$

$$t = -\frac{2}{7}$$

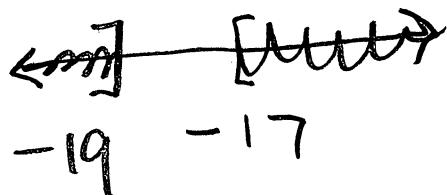
Solve $|k+18| + 7 \geq 11$. Express your solution as a graph.

$$4|k+18| \geq 4$$

$$k+18 \geq 1 \Rightarrow k \geq -17$$

$$|k+18| \geq 1$$

$$k+18 \leq -1 \Rightarrow k \leq -19$$



checks

$$-118 \checkmark T$$

$$82 \checkmark T$$

$$-18 \text{ false } \checkmark$$

Solve the system using addition $\begin{aligned} 6x - 4y &= -10 \\ 5x - 3y &= -11 \end{aligned}$

$$\begin{aligned} 3(6x - 4y) &= 3(-10) \\ -4(5x - 3y) &= -4(-11) \end{aligned}$$

$$\begin{array}{r} 18x - 12y = -30 \\ -20x + 12y = 44 \\ \hline -2x = 14 \end{array}$$

$$\begin{aligned} 6(-7) - 4y &= -10 \rightarrow y = -8 \\ -42 - 4y &= -10 \end{aligned}$$

$$\boxed{(-7, -8)} \quad \boxed{x = -7}$$

- 4) A mammal's average life span, L , in years, varies inversely as its average heart rate, R , in beats per minute. On average lions live to be 25 years old and have a heart rate of 76 beats per minute. Estimate the average life span for mice if their average heart rate is 634 beats per minute.

$$L = \frac{k}{R} \quad 25 = \frac{k}{76} \Rightarrow k = 1900$$

$$L = \frac{1900}{R} \text{ for mice } L = \frac{1900}{634} \approx 3$$

The average lifespan for a mouse would be about 3 years.

- 5) Use rational exponents to simplify $\frac{\sqrt[10]{x^2}}{\sqrt[5]{x^3}}$. If rational exponents appear after simplifying, write the answer in radical notation. If necessary, make sure to rationalize any denominators.

Assume that all variables represent positive numbers.

$$x^{\frac{2}{10} - \frac{3}{5}} = x^{\frac{1}{5} - \frac{3}{5}} = x^{-\frac{2}{5}} = \frac{1}{x^{\frac{2}{5}}}$$

$$= \frac{1}{\sqrt[5]{x^2}} \times \frac{\sqrt[5]{x^3}}{\sqrt[5]{x^3}} = \boxed{\frac{\sqrt[5]{x^3}}{x}}$$

- 6) Given $\frac{25}{5\sqrt{2} - 3\sqrt{5}}$ rationalize the denominator and simplify if possible.

$$\frac{25(5\sqrt{2} + 3\sqrt{5})}{(5\sqrt{2} - 3\sqrt{5})(5\sqrt{2} + 3\sqrt{5})} = \frac{25(5\sqrt{2} + 3\sqrt{5})}{25(2) - 9(5)}$$

$$= \frac{25(5\sqrt{2} + 3\sqrt{5})}{50 - 45} = 5(5\sqrt{2} + 3\sqrt{5})$$

7) Solve $\sqrt{x} = 5 - \sqrt{x+1}$. $\Rightarrow \{x \mid x \geq 0\}$

$$(\sqrt{x+1})^2 = (5 - \sqrt{x})^2$$

$$x+1 = 25 - 10\sqrt{x} + x$$

$$10\sqrt{x} = 24$$

$$\sqrt{x} = \frac{24}{10} = \frac{12}{5}$$

$$\rightarrow x = \frac{144}{25} \text{ and } \frac{144}{25} \geq 0$$

$$\left\{ \frac{144}{25} \right\}$$

8) Solve $(x+6)^{\frac{1}{3}} + 6 = 5$.

$$(x+6)^{\frac{1}{3}} = -1$$

$$[(x+6)^{\frac{1}{3}}]^3 = (-1)^3$$

$$\begin{aligned} x+6 &= -1 \\ x &= -7 \end{aligned}$$

Check

$$\begin{aligned} (-7+6)^{\frac{1}{3}} + 6 & \\ (-1)^{\frac{1}{3}} + 6 & \\ -1 + 6 & \\ 5 \checkmark \end{aligned}$$

9) Simplify. Write your result in the form $a + bi$.

a. $(-5+4i)-(7i-1)$

$$\begin{aligned} -5+4i-7i+1 &\rightarrow -3i-4 \\ &\boxed{-4 + -3i} \end{aligned}$$

b. $(-5+4i)(7i-1)$

$$\begin{aligned} -35i + 5 + 28i^2 - 4i &= -39i + 5 - 28 \\ &= \boxed{-23 + -39i} \end{aligned}$$

c. $\frac{3+i}{6-i}$

$$\begin{aligned} \frac{(3+i)(6+i)}{(6-i)(6+i)} &= \frac{18+3i+6i+i^2}{36-i^2} = \frac{18+9i-1}{36+1} = \frac{17+9i}{37} \\ &\boxed{\frac{17}{37} + \frac{9}{37}i} \end{aligned}$$

10) Solve $(x-4)^2 = \frac{1}{3}$ using the square root method.

$$(x-4) = \pm \sqrt{\frac{1}{3}} = \pm \frac{\sqrt{3}}{3}$$

$$\boxed{x = 4 \pm \frac{\sqrt{3}}{3}}$$

11) Solve by completing the square $x^2 - 4x - 5 = 0$

$$x^2 - 4x + 4 = 5 + 4 \quad (-\frac{4}{2})^2 = (-2)^2 = 4$$

$$(x-2)^2 = 9$$

$$x-2 = \pm\sqrt{9} = \pm 3$$

$$x = 2 \pm 3$$

$$\{-1, 5\}$$

12) Solve by completing the square $9x^2 - 6x - 17 = 0$

$$9x^2 - 6x = 17$$

$$x^2 - \frac{6}{9}x = \frac{17}{9}$$

$$x^2 - \frac{2}{3}x = \frac{17}{9}$$

$$(\frac{1}{2} \cdot -\frac{2}{3})^2 = (-\frac{1}{3})^2 = \frac{1}{9}$$

$$x^2 - \frac{2}{3}x + \frac{1}{9} = \frac{17}{9} + \frac{1}{9}$$

$$(x - \frac{1}{3})^2 = \frac{18}{9} = 2$$

$$x - \frac{1}{3} = \pm\sqrt{2}$$

$$x = \frac{1}{3} \pm \sqrt{2}$$

$$\{\frac{1}{3} - \sqrt{2}, \frac{1}{3} + \sqrt{2}\}$$

- 13) Fill in the missing exponents and use the table, and exponent properties, to find the needed products, quotients or powers. You must show the steps involving the exponent properties.

Exponent	1.6128	1.8865	3.4993	4.8384	5.3858
Base	10	10	10	10	10
Natural Number	41	77	3157	68,921	243,089

a. $77 \times 41 = 10^{1.8865} \times 10^{1.6128} = 10^{3.4993} \Rightarrow 3,157$

b. $\frac{243,089}{3,157} = \frac{10^{5.3858}}{10^{3.4993}} = 10^{1.8865} \Rightarrow 77$

c. $41^3 (10^{1.6128})^3 = 10^{3(1.6128)} = 10^{4.8384} \Rightarrow 68,921$

- 14) Rewrite as a sum or difference using the logarithmic properties.

a. $\ln\left(\frac{x^2}{\sqrt{y}}\right) \Rightarrow \ln x^2 - \ln \sqrt{y} \Rightarrow 2\ln x - \ln y^{\frac{1}{2}} \Rightarrow \boxed{2\ln x - \frac{1}{2}\ln y}$

b. $\log_4(16k)$

$$\log_4 16 + \log_4 k \Rightarrow \boxed{2 + \log_4 k}$$

- 15) Rewrite as a single logarithm.

a. $\frac{1}{3}\ln x + \ln(x+1) \Rightarrow \ln x^{\frac{1}{3}} + \ln(x+1) \Rightarrow \ln \sqrt[3]{x} + \ln(x+1)$

b. $\ln x + 2\ln y - 3\ln z$

$$\Rightarrow \boxed{\ln(\sqrt[3]{x}(xy^2))}$$

$$\ln x + \ln y^2 - \ln z^3 \Rightarrow \ln(xy^2) - \ln z^3 \Rightarrow \boxed{\ln \frac{xy^2}{z^3}}$$

- 16) A company mixes a fruit drink, which is 3% fruit juice, with a fruit cocktail, which is 18% fruit juice, to make 60,000 gallons of fruit "surprise", which is 12% fruit juice. How many gallons of fruit drink and how many gallons of fruit juice must be used? You must use a system of equations to answer the question.

let D = Gallons of
Fruit Drink

There are 24,000
gallons of fruit drink

let C = Gallons of
Fruit cocktail

There are 36,000
gallons of fruit cocktail

$$D + C = 60,000 \Rightarrow D = 60,000 - C$$

Fruit Juice + Fruit Juice = Fruit Juice

$$.03(D) + .18(C) = .12(60,000)$$

$$.03(60,000 - C) + .18C = 7200$$

$$1800 - .03C + .18C = 7200$$

$$.15C = 5400$$

check

$$C = 36,000 \quad D = 60,000 - 36,000 \\ = 24,000$$

$$.03(24,000)$$

$$+ .18(36,000)$$

$$= 7200 \checkmark$$