Math 7A: Unit 2 Test
SAMPLE

100 points Name: ______________________

CIRCLE T FOR TRUE, F FOR FALSE.

T F (1) Factoring, $8x^{1/3}-4x^{-2/3}$ simplifies to $\frac{4(2x-1)}{x^{2/3}}$

T F (2) The expression (x+1)(x-1) + $(4x^3 - 7x^2 - 6x + 1)$ is factored.

T F (3) Simplifying completely: $\left(25a^2b^3\right)^{3/2} = 125a^3b^{9/2}$

T F (4) $\frac{40x^{-8}y^2}{32x^{-3}y^{-1}} = \frac{5y^3}{4x^5}$

T F (5) $f(x) = x^3-x$ is an odd function.

Fill in the blanks.

(6) Using the definition of absolute value, $|x-3| = \begin{cases} x-3 \text{ if } & x \geq 3 \\ -(x-3) \text{ if } & x < 3 \end{cases}$

(7) Simplify. Express answer using only positive exponents $\left(7a^3b\right)\left(2a^{-3}b^6\right)$ $14b^7$

(8) What is the average rate of change of f(x)= 3x+1 ___3___

(9) Simplify $\frac{4-\sqrt{5}}{2-\sqrt{6}}$ = $\frac{8-2\sqrt{5}+4\sqrt{6}+\sqrt{30}}{-2}$ $\frac{4-\sqrt{5}}{2-\sqrt{6}} \cdot \frac{2+\sqrt{6}}{2+\sqrt{6}} = \frac{8-2\sqrt{15}+4\sqrt{6}+\sqrt{30}}{4-6}$

(10) $\sqrt{45x^7y^2z^8}$ = $3|x^3y|z^4\sqrt{5x}$ (do not assume variables represent positive numbers)
$9x^6 \quad 5x$

(11) Simplify:

(a) $\frac{\frac{1}{x^3}-\frac{1}{y^3}}{\frac{1}{x}-\frac{1}{y}} \cdot \frac{x^3y^3}{x^3y^3}$

$$\frac{y^3-x^3}{x^2y^3-x^3y^2} = \frac{(y-x)(y^2+yx+x^2)}{x^2y^2(y-x)}$$

$$= \frac{y^2+xy+x^2}{x^2y^2}$$

(b) $\frac{1}{x+3}-\frac{2}{(x+3)^2}+\frac{3}{x^2-9}$

$$\frac{x^2-9-2(x-3)+3(x+3)}{(x+3)^2(x-3)}$$

$$\frac{x^2+x+6}{(x+3)^2(x-3)}$$

(12) Find the domain. Express answer in interval notation:

(a) f(x)= $\frac{2x-7}{15+7x-2x^2}$

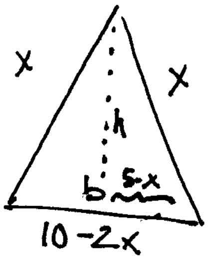
denom $\neq 0$
$15+7x-2x^2 \neq 0$
$(5-x)(3+2x)$
$x \neq 5, -3/2$

$(-\infty,-\frac{3}{2})\cup(-\frac{3}{2},5)\cup(5,\infty)$

(b) g(x)= $\sqrt{7-x}$

radicand ≥ 0
$7-x \geq 0$
$x \leq 7$
$(-\infty,7]$

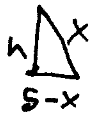
(13) An isosceles triangle has a perimeter of 10 cm. If the length of each of the equal sides is x, express the area of the triangle as a function of x. Simplify



If two sides are x and the perimeter is 10 then

$x+x+b=10$ so $\underline{b=10-2x}$

To find ht :



$h^2+(5-x)^2=x^2$

$h^2=x^2-(5-x)^2=10x-25$ $\quad h=\sqrt{10x-25}$

So Area $=\frac{1}{2}bh=\frac{1}{2}(10-2x)\sqrt{10x-25}=(5-x)\sqrt{10x-25}$

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(14) Find the center and radius of the circle: $x^2+y^2-4x+y-1=0$.

$x^2-4x \quad y^2+y \quad =1$

$x^2-4x+4+y^2+y+\frac{1}{4}=1+4+\frac{1}{4}$

$(x-2)^2+(y+\frac{1}{2})^2=\frac{21}{4}$

Center $(2,-\frac{1}{2})$

$r=\frac{\sqrt{21}}{2}$

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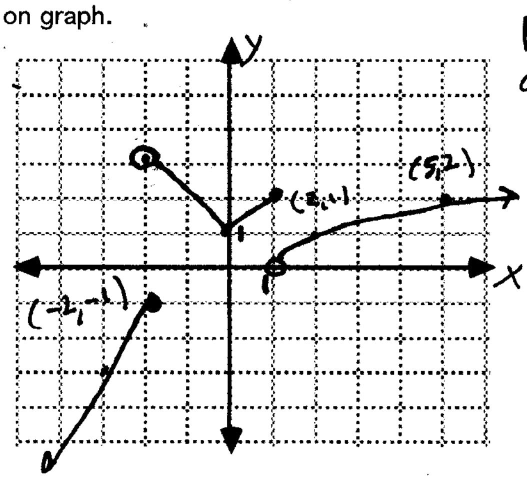
(15) Graph $\begin{cases} 2x+3 & \text{if } x\le -2 \\ |x|+1 & \text{if } -2<x\le 1 \\ \sqrt{x-1} & \text{if } x>1 \end{cases}$ Show axes and scale. Label coordinates of 2 points on graph.



Make it clear if points at ends are included or not.

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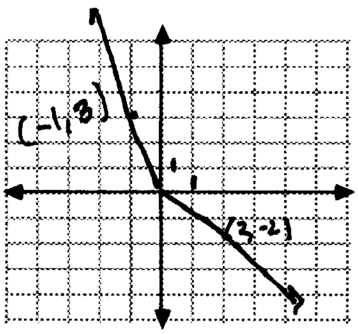
(16) Rewrite f(x) as a piecewise function, using the definition to remove the absolute value bars. Then graph the function.

$f(x)=|x|-2x$

$f(x)=|x|-2x=\begin{cases} x-2x & \text{if } x\ge 0 \\ -x-2x & \text{if } x<0 \end{cases}=\begin{cases} -x & \text{if } x\ge 0 \\ -3x & \text{if } x<0 \end{cases}$



(17) Factor Completely:

(a) $2a^6 - 128$

$2(a^6-64)$

$2((a^2)^3-4^3)$

$2(a^2-4)(a^4+4a^2+16)$

$2(a-2)(a+2)(a^4+4a^2+16)$

(b) $\underbrace{2xa+3a}\,\underbrace{-8x-12}$

$a(2x+3)-4(2x+3)$

$(a-4)(2x+3)$

(c) $\underbrace{3x^2(3x+4)^2}+\underbrace{x^3 \bullet 2(3x+4) \bullet 3}$

$3x^2(3x+4)[(3x+4)+2x]$

$3x^2(3x+4)(5x+4)$

(d) $x^{1/2} - 7x^{-1/2} + 12x^{-3/2}$

$x^{-3/2}(x^2-7x+12)$

$\dfrac{(x-3)(x-4)}{x^{3/2}}$

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(18) Solve. Express answer in interval notation. Show all work. No credit given for improper method.

(a) $|2x-3|>4$

$2x-3>4$ <u>OR</u> $2x-3<-4$

$2x>7$ $\qquad$ $2x<-1$

$x>7/2$ $\qquad$ $x<-1/2$

$(-\infty,-1/2)\cup(\frac{7}{2},\infty)$

(b) $12-x-x^2>0$

$(4+x)(3-x)>0$

Need signchart

$-\quad +\quad -$

$-4\quad 3$

$(-4,3)$

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(19) Solve.

(a) (x-3)(2x+1)=4

$2x^2-5x-3=4$

$2x^2-5x-7=0$

$(2x-7)(x+1)=0$

$x=7/2,\ -1$

(b) $3x^2-\frac{1}{2}x-2=0$

$6x^2-x-4=0$

$x=\dfrac{1\pm\sqrt{1-4(6)(-4)}}{12}=\dfrac{1\pm\sqrt{97}}{12}$

(20) Find a function which represents the distance between the point (2,-1) and a point on the graph of $y=x^2$

Let $(x,y) = (x,x^2)$ be any point on $y=x^2$

Then dist (x,y) to $(2,-1)$ is $d(x)$ $\sqrt{(x-2)^2+(y+1)^2} = \sqrt{(x-2)^2+(x^2+1)}$

(21) Simplify: (5 points each)

(a) $\dfrac{2\sqrt{1+x}-\dfrac{x}{\sqrt{1+x}}}{1+x}$ $\dfrac{\sqrt{1+x}}{\sqrt{1+x}}$

$\dfrac{2(1+x)-x}{(1+x)^{3/2}}$

$\dfrac{2+x}{(1+x)^{3/2}}$

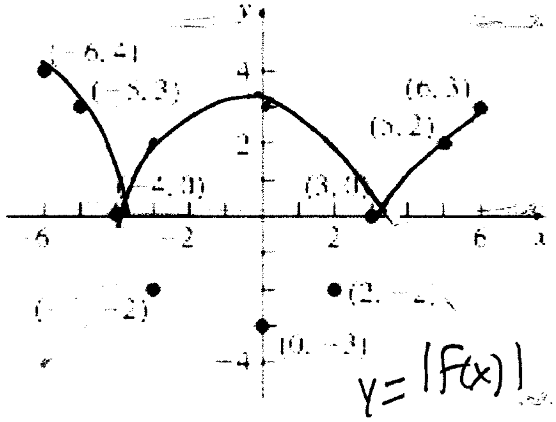
(b) $\dfrac{\frac{2}{3}(x^2+4)(2x+1)^{-2/3}-(2x+1)^{1/3}2x}{(x^2+4)^2}$

$\dfrac{\frac{2}{3}(2x+1)^{-2/3}\left[(x^2+4)-3x(2x+1)\right]}{(x^2+4)^2}$

$\dfrac{2(-5x^2-3x+4)}{3(2x+1)^{2/3}(x^2+4)^2}$

practice MORE of These

(21) Using the graph of f(x) below, find



$y=|F(x)|$

(a) f(-3) -2

(b) f(0) -3

(c) For what values of x is f(x)<0 (-4, 3)

(d) What are the zeros of f? -4, 3

(e) For what number(s) x does f(x)=3? -5, 6

(e) What is the y intercept of f? -3

(f) Domain of f: [-6, 6]

(g) Range of f: [-3, 4]

(i) On what interval is f increasing? (0, 6)

(j) On what interval is f decreasing? (-6, 0)

(k) What is the absolute maximum value of f(x)? 4

(l) What is the absolute minimum value of f(x)? -3

(m) Sketch the graph of $y=|f(x)|$