100 points   Name: _____

CIRCLE T FOR TRUE, F FOR FALSE.

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

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) $\dfrac{40x^{-8}y^2}{32x^{-3}y^{-1}} = \dfrac{5y^3}{4x^5}$

T   F   (5) f(x) = x³-x is an odd function.

Fill in the blanks.

(6) Using the definition of absolute value, $|x-3| = \begin{cases} x-3 & if \quad \underline{\hspace{2cm}} \\ -(x-3) & if \quad \underline{\hspace{2cm}} \end{cases}$

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

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

(9) Simplify $\dfrac{4-\sqrt{5}}{2-\sqrt{6}}$ =_____

(10) $\sqrt{45x^7y^2z^8}$ = _____ (do not assume variables represent positive numbers)

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(11) Simplify:

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

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

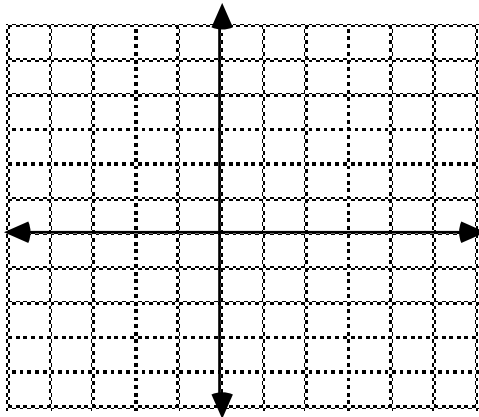(12) Find the domain. Express answer in interval notation:

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

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

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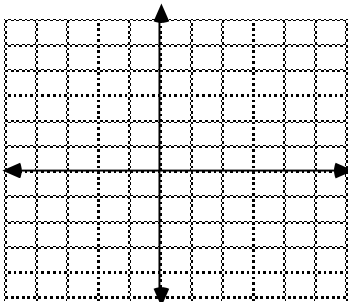sides is x, express the area of the triangle as a function of x. Simplify

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

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

on graph.

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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.

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

(17) Factor Completely:

(a) $2a^6 - 128$

(b) 2xa+3a-8x-12

(c) $3x^2(3x+4)^2 + x^3 \cdot 2(3x+4) \cdot 3$

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

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

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

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

(19) Solve.

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

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

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

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(21) Simplify: (5 points each)

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

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

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

(a) f(-3) _____

(b) f(0) _____

(c) For what values of x is f(x)<0 _____

(d) What are the zeros of f? _____

(e) For what number(s) x does f(x)=3? _____

(e) What is the y intercept of f?_____

(f) Domain of f: _____

(g) Range of f: _____

(i) On what interval is f increasing? _____

(j) On what interval is f decreasing? _____

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

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

(m) Sketch the graph of $y = |f(x)|$
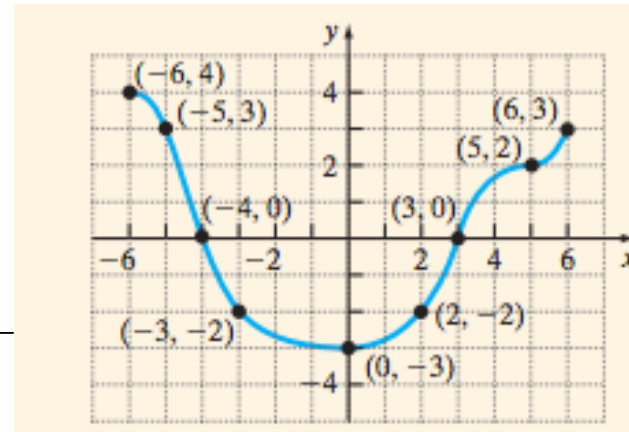
(1) For each of the following angles, determine which quadrant it is and find the reference angle. Answer should be in the units given. 1 point each blank.

ANGLE	QUADRANT	REFERENCE ANGLE
220°		
100°		
92°		
-300°		
$8\pi / 7$		
$5\pi / 3$		
$11\pi / 10$		

(2) For each of the following, find 4 angles, one in each quadrant, having the given angle as a reference angle. Answer in the units given. 1 point each blank.

12°	
45°	
$\pi / 10$	
$2\pi / 5$	
1	