CALCULUS

This Packet is required. Selected answers are attached to check your work. There will be a quiz on this material after going over the packet in class. You should be able to complete the packet (all three parts) without the use of a calculator (unless indicated), but you may use a calculator to check your work.

Be sure to show all work either on the worksheets or on a separate sheet of paper. This WILL be collected.

Calculus, .   Name _____

Summer Packet Part #1

1) Find the distance between:

    a) $P\,(-2,3)$ and $Q(4,-1)$ b) $P\left(\sqrt{2},\sqrt{3}\right)$ and $Q(\pi,\pi)$

2) Show that this equation represents a circle. Find the center and radius. (a) use completing the square to rewrite into (h,k) form. (b) Solve for "y".

    $x^2 - 2x + y^2 + 6y = -6$

3) Find the equation of a line given:

    a) $(2,3),\ m = 6$ (leave answer in point-slope form)

    b) $(4,5),(-2,1)$ (leave answer in slope-intercept form)

    c) $(2,3),(3,3)$

    d) $(5,9),(5,0)$

    e) $(-4,2),(6,-1)$ (leave answer in standard form)

4) Find the equation of a line through the point of intersection of $3x + 4y = 8$ and $6x - 10y = 7$ that is perpendicular to the first of these two lines. Leave in Point-Slope form.

5) Show that the two circles do not intersect:

$$x^2 + y^2 - 4x - 2y - 11 = 0 \qquad\qquad x^2 + y^2 + 20x - 12y + 72 = 0$$

(Hint – find the distance between the centers.)

6) Find the intercepts algebraically: $y^2 - x + y - 6 = 0$

7) Find the points of intersection of the line $y = -2x + 2$ and the parabola $y = 2x^2 - 4x - 2$

8) Solve these inequalities:

a) $|x - 4| < 2$

b) $|3x - 5| \geq 1$

c) $x^2 - 5x - 6 > 0$

d) $2x^2 + 5x - 3 > 0$

e) $\dfrac{x+4}{x-3} \geq 0$

f) $\dfrac{2}{x} < 5$

Calculus   Name _____

Summer Packet Part #2

1) If $f(x) = x^2 - 2x$, find and simplify:

    a) $f(4)$ b) $f(4+h)$

    c) $f(a+h)$ d) $f(4+h) - f(4)$

    e) $\dfrac{f(4+h) - f(4)}{h}$

2) Evaluate the greatest integer function $f(x) = [x]$:

    a) $f(-3.1)$ b) $f(-1.2)$ c) $f(3.1)$ d) $f(5.6)$

3) Verify: (work only on one side of the equation – show the two sides are the same.)

    a) $\left(1 - \cos^2 x\right)\left(1 + \cot^2 x\right) = 1$ b) $\dfrac{1 - \csc^2 \theta}{\csc^2 \theta} = \dfrac{-1}{\sec^2 \theta}$

4) Evaluate without the aid of a calculator:

    a) $\tan \dfrac{\pi}{6}$ b) $\cot \dfrac{\pi}{4}$ c) $\csc \dfrac{\pi}{4}$
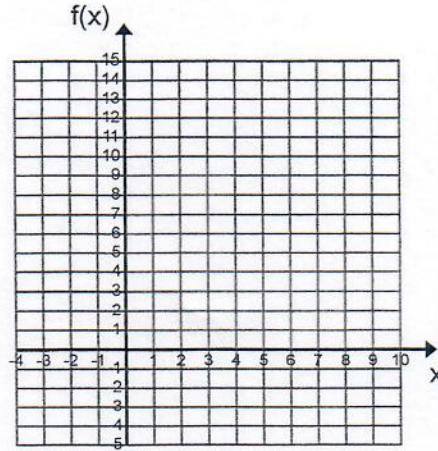
    d) $\cot \dfrac{\pi}{2}$ e) $\sec \dfrac{\pi}{3}$ f) $\tan \dfrac{-\pi}{6}$

5) Graph the following piecewise function then find the indicated values:

$$f(x) = \begin{cases} -2x, & x < -1 \\ x^2 - 3, & -1 \le x < 4 \\ \sqrt{x} - 4, & x > 4 \end{cases}$$

f(x)

a) $f(-1)$ b) $f(2)$ c) $f(4)$

d) Domain: e) Range:

f) Increasing intervals:

g) Decreasing Intervals:

Calculus :   Name _____

Summer Packet Part #3

1) Solve these trig equations over the interval $[0, 2\pi)$: (Exception – you MUST use your calculator on a few parts of this problem.)

a) $\sin x = \dfrac{4}{5}$

b) $\cos x = -1.5$

c) $2\cos x \sin x - \cos x = 0$

d) $\tan x \sin^2 x = \tan x$

e) $\tan^2 x = 3$

f) $\sin 2x = 1$

2) Find all vertical and horizontal asymptotes for the given functions:

a) $f(x) = \dfrac{x}{x^2 + 1}$

b) $f(x) = \dfrac{x^2}{x^2 - 1}$

c) $f(x) = \dfrac{x^3}{x^2 - 4}$

d) $h(x) = \tan 2x, \; -2\pi \le x \le 2\pi$

e) $y = \dfrac{3x^3 - 2x}{8x^3 - 1}$

f) $3x^2 y + x^2 = 5y - x$ (Hint – solve for y)

3) Use long division and show all work:

a) $2x^4 - x^3 - 2 \div (2x^2 + x + 1)$

b) $4x^3 - 8x^2 + 2x - 1 \div (2x + 1)$

c) $\dfrac{x^4 - 3x^3 + 6x^2 - 3x + 5}{x^2 + 1}$

4) Simplify:

a) $\dfrac{\dfrac{a}{2x+h} - \dfrac{a}{2x}}{h}$

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

c) $\dfrac{\dfrac{a}{b} - a}{a + \left(\dfrac{a}{b}\right)^2}$

d) Show that $\dfrac{\sqrt{x+9} - 3}{x} = \dfrac{1}{\sqrt{x+9} + 3}$

5) Factor:

a) $x^3 - 27$

b) $x^4 - 16$

c) $8y^3 + 1000$

d) $3x^3 - 7x^2 - 27x + 63$

6) Add or subtract:

a) $\dfrac{3ab}{b} + 2a$

b) $\dfrac{x}{x+3} - 2x$

Selected Answers to Summer Packet:

Part #1

1. a) $2\sqrt{13}$

3. b) $y = \dfrac{2}{3}x + \dfrac{7}{3}$

6. $(0,-3),\ (0,2),\ (-6,0)$

8. e) $(-\infty,-4]\ [3,\infty)$

Part #2

1. d) $h^2 + 6h$

2. c) 3

4. e) 2

5. b) 1

Part #3

2. c) H: none   V: $x = \pm 2$

3. b) $2x^2 - 5x + \dfrac{7}{2} - \dfrac{9}{4x+2}$

5. d) $(x+3)(x-3)(3x-7)$