Algebra 3-4 Study Guide for 2nd Semester Final Name _____ Per ____

Trigonometry Unit

1) Rewrite each angle into degrees or radians.

$\frac{305°}{360} \cdot 2\pi$ $\frac{2\pi}{5} \cdot 360$ $\frac{-135°}{360} \cdot 2\pi$

$\frac{170°}{360} \cdot 2\pi$ $\frac{-30\pi}{31} \cdot 360$ $\frac{4\pi}{2\pi} \cdot 360$

2) Use your Unit Circle to find the exact value of the following.

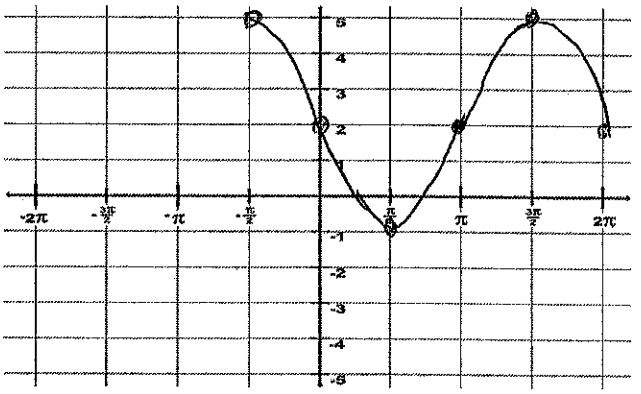
$\sin(225°) = -\sqrt{2}/2$ $\cos(225°) = -\sqrt{2}/2$ $\tan(225°) = 1$

$\sin(-5\pi/6) = -1/2$ $\cos(5\pi/3) = 1/2$ $\tan(\pi) = 0$

3) Use your Unit Circle to find the anglesin radians for the domain $0 \le \theta < 2\pi$.

$\sin(\theta) = ½$ $\pi/6$ & $5\pi/6$ $\cos(\theta) = -\frac{\sqrt{2}}{2}$ $3\pi/4$ & $5\pi/4$ $\tan(\theta) = -1$ $3\pi/4$ & $7\pi/4$

4) Investigate the function $y = 3\sin(x - \pi) + 2$
Graph at least one full wave of the function.



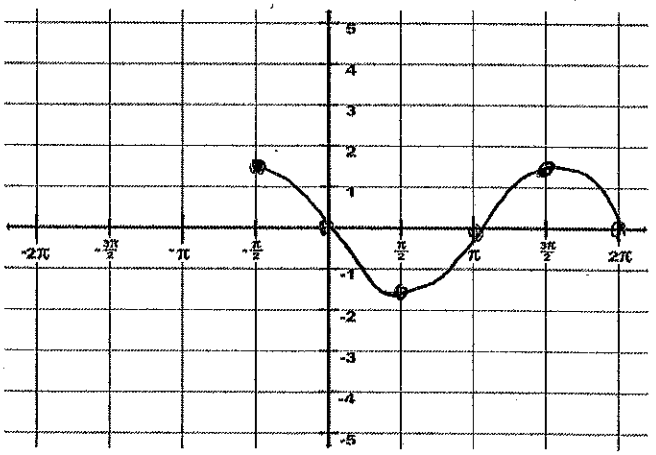
x-intercepts: ~~SKIP~~

y-intercept: (0, 2)

domain: $(-\infty, \infty)$ range: $[-1, 5]$

family: Sine

5) Graph $y = 3/2\cos(x + \pi/2)$



What does the '3/2' do to the graph?

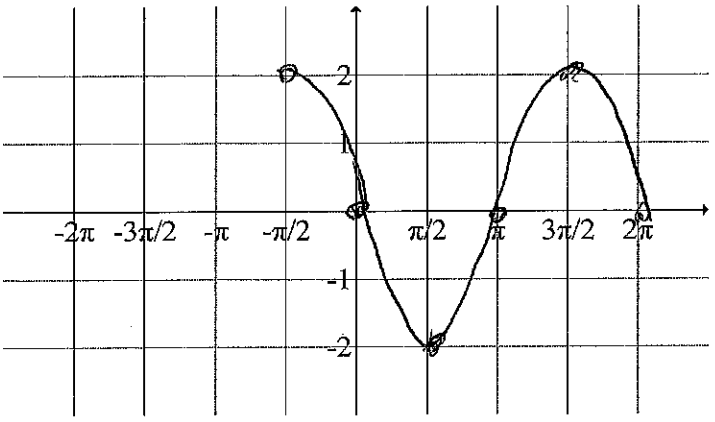
Vertical stretch

What does the '+ π/2' do to the graph?

Horizontal Shift

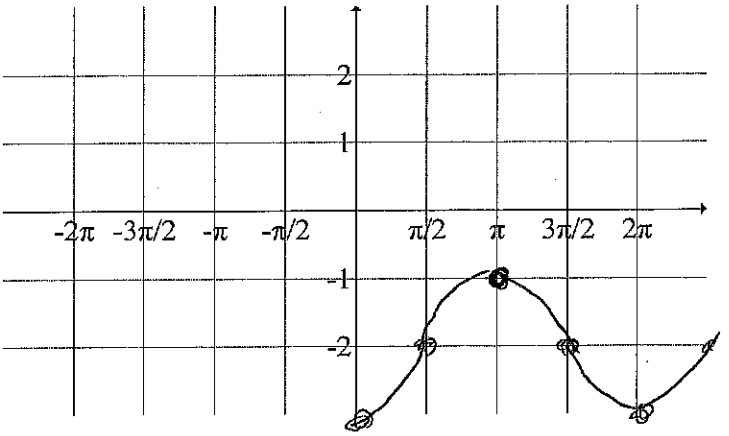
For Problems 6-7, sketch and name 5 points of the graphs of:

6) $y = -2\sin(x)$



5 points: $(-\pi/2, 2)$ $(0,0)$ $(\pi/2, -2)$ $(3\pi/2, 2)$ $(\pi, 0)$

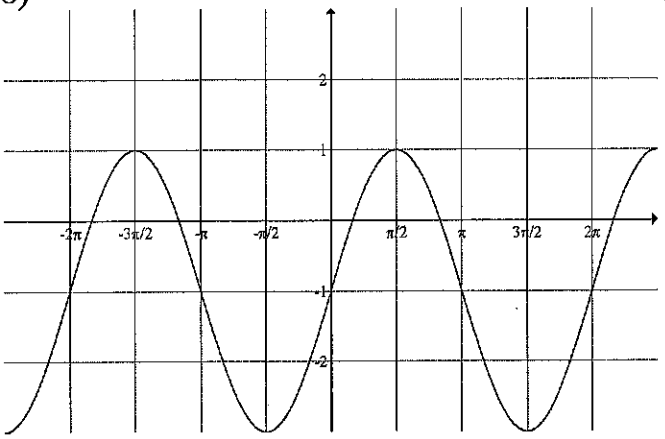
7) $y = \cos(x - \pi) - 2$



5 points: $(0, -3)$ $(\pi/2, -2)$ $(\pi, -1)$ $(3\pi/2, -2)$ $(2\pi, -3)$

For problems 8-9, write two possible equations for each graph.

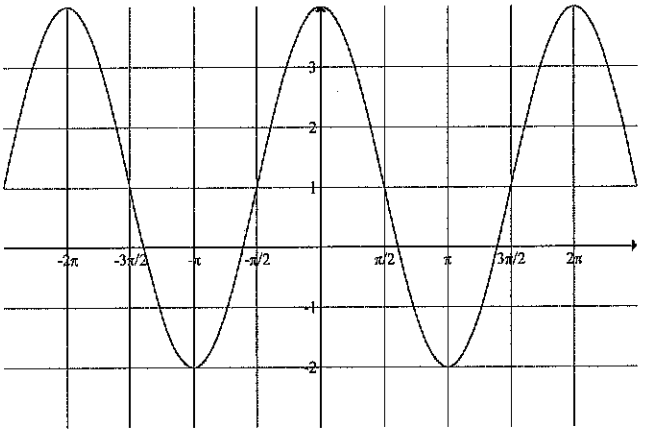
8)



$y = 2\sin(x) - 1$

$y = 2\cos(x - \pi/2) - 1$

9)



$y = 3\cos(x) + 1$

$y = 3\sin(x + \pi/2) + 1$

Polynomials Unit

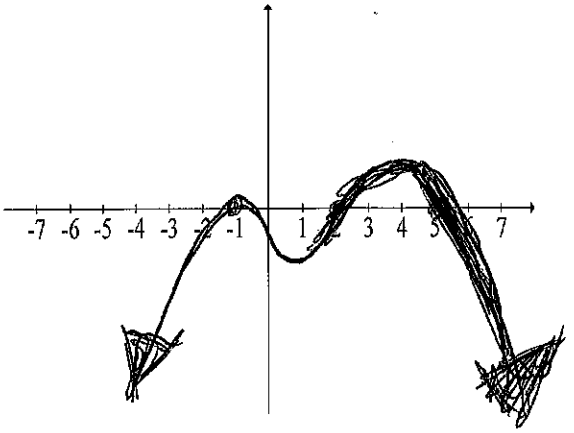
10) Sketch a graph of the polynomial given and state the degree, roots, and end behavior.

$y = -(x - 2)(x + 1)^2(x - 5)$

degree: 4

roots: 2, -1, 5

end behavior: Negative, Even
Both down



11) Give the general equation of the polynomial and state the degree, roots, and end behavior.

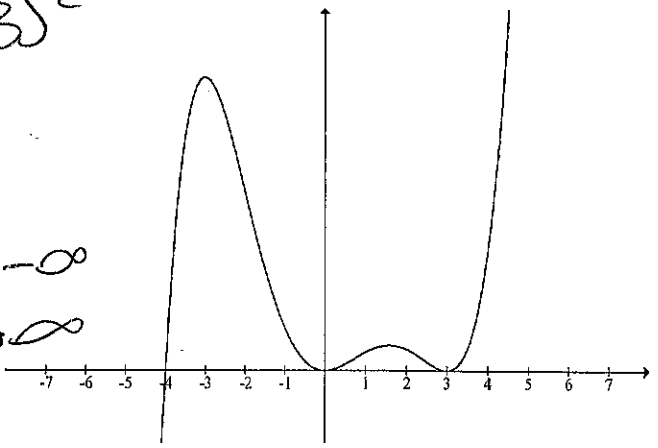
Equation: $y = a(x+4)x^2(x-3)^2$

degree: 5

roots: $-4, 0, 3$

end behavior: As $x \to -\infty, y \to -\infty$

As $x \to \infty, y \to \infty$



12) Give the exact equation of the polynomial using the point given that is not on the x-axis.

Equation: $y = a(x+4)^2 x(x-5)$

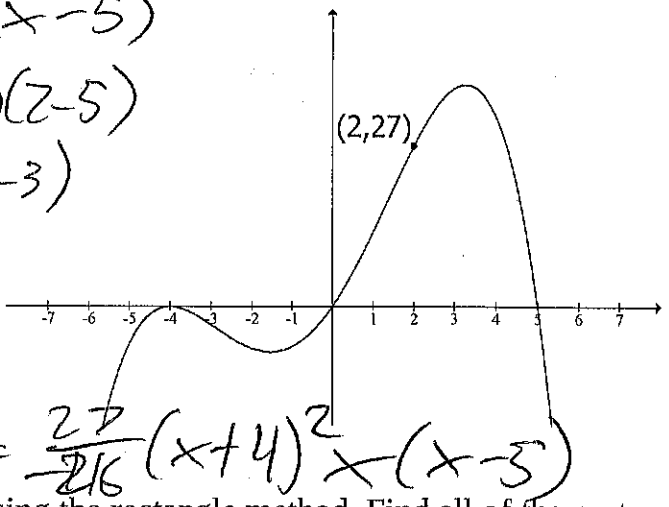
work: $27 = a(2+4)^2(2)(2-5)$

$27 = a(6)^2(2)(-3)$

$27 = a \cdot (36)(-6)$

$27 = a(-216)$

$\frac{27}{-216} = a$



$y = \frac{27}{-216}(x+4)^2 x(x-5)$

13) Find the factored form of the polynomial using the rectangle method. Find all of the roots.

$y = x^3 - 8x^2 - 15x + 54$ root: 9

factored form: $(x-9)(x-2)(x+3)$

roots: $x=9, x=2, x=-3$

	x^2	x	-6
x	x^3	$1x^2$	$-6x$
-9	$-9x^2$	$-9x$	54

$x^2 + x - 6 = (x-2)(x+3)$

	x	$+3$
x	x^2	$3x$
-2	$-2x$	-6

13 ½) Find the factored form of the polynomial. Then, find all of the roots.

$y = x^3 + x^2 - 7x + 65$

Possible roots $= \pm 1, 5, 13, 65$

-5 is not

factored form: $(x+5)(x^2-4x+13)$

roots: $x = -5, x = 2 \pm 3i$

	x^2	$-4x$	$+13$
x	x^3	$-4x^2$	$13x$
$+5$	$5x^2$	$-20x$	65

$x^2 - 4x + 13$

$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(13)}}{2(1)} = \frac{4 \pm \sqrt{16-52}}{2} = \frac{4 \pm \sqrt{-36}}{2} = \frac{4 \pm 6i}{2}$

14) Write the equation in standard form that has the given roots.

roots: 6, $1+5i$, $1-5i$

$x-1-5i$

$\times$	x^2	$-1x$	$-5ix$
-1	$-1x$	1	$5i$
$5i$	$5ix$	$-5i$	$-25i^2$

$= x^2-2x+26$

$x^2-2x+26$

$\times$	x^3	$-2x^2$	$26x$
-6	$-6x^2$	$12x$	-156

$x^3-8x^2+28x-156$

15) Use the quadratic formula to determine the types of roots that the quadratics have.

a) $y = 3x^2 - 3x + 5$

$x = \frac{-(-3)\pm\sqrt{(-3)^2-4(3)(5)}}{2(3)}$

$= \frac{3\pm\sqrt{9-60}}{6} = \frac{3\pm\sqrt{-51}}{6} = \frac{3\pm\sqrt{51}i}{6}$

b) $y = -2x^2 + 4x + 5$

$x = \frac{-4\pm\sqrt{4^2-4(-2)(5)}}{2(-2)}$

$x = \frac{-4\pm\sqrt{16+40}}{-4} = \frac{-4\pm\sqrt{56}}{-4}$

16) Simplify the expressions.

a) $(10 + 2i)(10 - 2i)$

$10+2i$

10	100	$20i$
$-2i$	$-20i$	$-4i^2$

$= 104$

b) $\sqrt{-200}\cdot\sqrt{-9}\cdot\sqrt{-2}$

$\sqrt{400}\cdot\sqrt{-9}$

$20\cdot 3i$

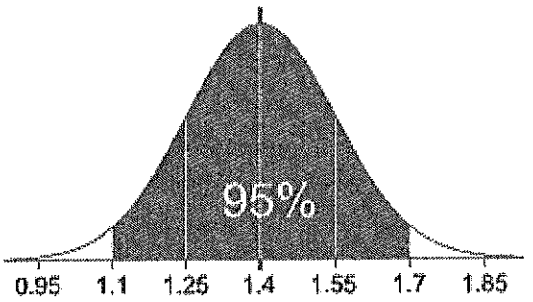
$60i$

c) $1-3i-7-2i+3$

$-3-5i$

Statistics Unit

17) The graph at the right represents the normal distribution of the height (in meters) of rose bushes at the park.



What is the median height of the rose bushes? 1.4

What is the mean height of the rose bushes? 1.4

What is the standard deviation of the data? 0.15

What percentage of the roses are taller than 1.7 m? 2.5%

What percentage of the roses are between 1.2 and 1.5 m? = 65.6%

What does the 95% represent in the graph? 95% of roses are between 1.1 & 1.7m tall

What percentage of the roses are less than 1.4 meters tall? 50%

What is the z-score of … 1.25? 1.15? 1.5? -1, -1.66, $.66$

What is the raw score of a value with a z-score of … 0? 1? -0.5? +2.3?

1.4, 1.55, 1.325, 1.745

18) Given the data below, find the mean, median, mode, range and standard deviation. Use your calculator to create a histogram and a box plot. Sketch both graphs.

Ages of people at a birthday party: ~~3, 7, 5, 13, 20, 23, 9, 23, 40, 23, 14, 12, 56, 23, 29~~

$\bar{x} = 22$ Median = 23 Range = 56 − 3 = 53

$s_x = 14.51$ Mode = 23