CP1 Math 3B/4A
Final Exam
2016

Name: _____

Circle your teacher and block.

Teacher: Nitsch Peletier

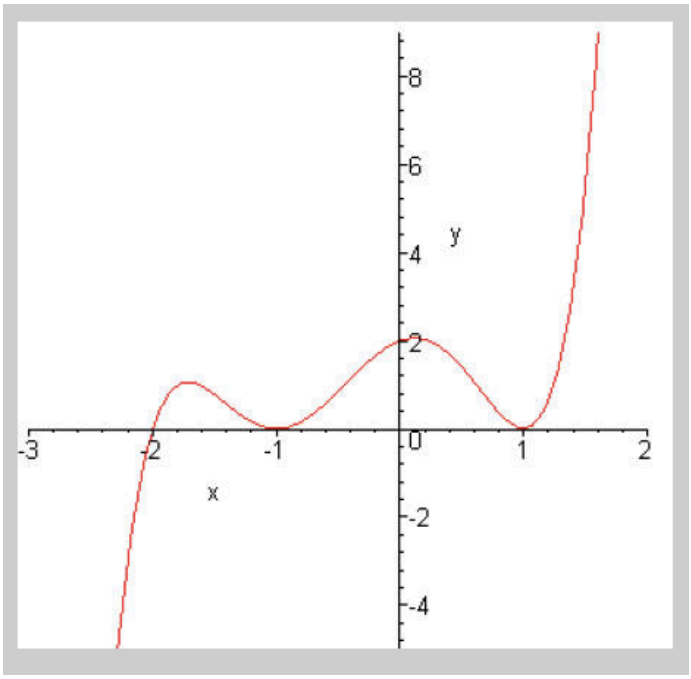
Block: A or C D or H

Instructions:

- This is a 90-minute exam, but you will be allowed to work for up to 120 minutes (2 hours).
- You may use your calculator throughout the entire exam. Students may not share a calculator under any circumstances.
- **Read the instructions** for each problem carefully. Answer each problem completely and carefully.
- **Show all work**. If you do not show work, you will not receive partial credit for an incorrect answer. If you do not show work, you may not receive full credit for a correct answer.
- Point values are specified next to each problem. In total, there are **100** points that you can earn.

Page 1 (14 pts)	Page 2 (11 pts)	Page 3 (19 pts)	Page 4 (16 pts)	Page 5 (12 pts)	Page 6 (8 pts)	Page 7 (8 pts)	Page 8 (12 pts)	Raw Score	Letter Grade
								/ 100	

1. State the following for the polynomial $f(x)$ whose graph is below.



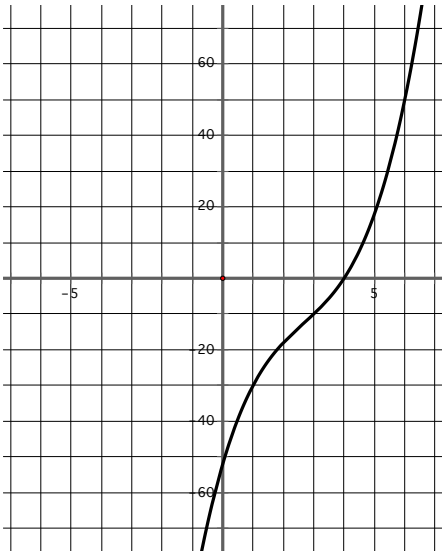
a. Is the leading coefficient of $f(x)$ positive or negative? Give a reason for your answer. (2 pts)

b. Is the degree of $f(x)$ even or odd? Give a reason for your answer. (2 pts)

c. What are the zeros of $f(x)$? For each zero, state whether the multiplicity is even or odd. (5 pts)

d. Write a function formula in factored form for the smallest possible degree polynomial with this graph. Note that $f(0) = 2$. (5 pts)

2. The following is a graph of $f(x) = x^3 - 8x^2 + 29x - 52$.



a. Factor $f(x)$ completely in the real number system. Your answer should be the product of linear and irreducible quadratic factors, each with real coefficients. (3 pts)

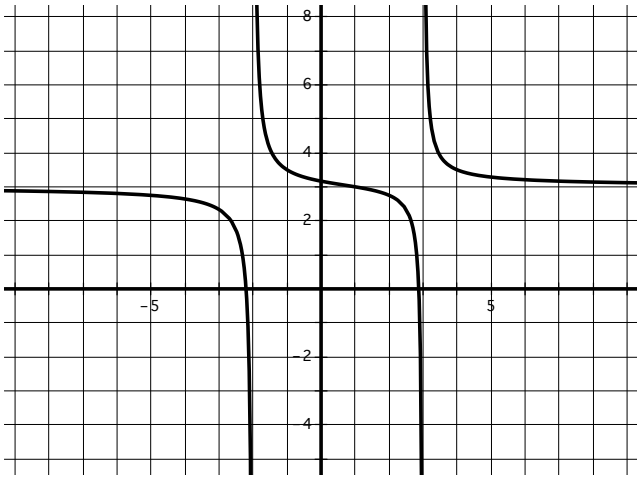
$f(x) =$ _____

b. Find all zeros of $f(x)$. (4 pts)

Zeros: _____

3. Algebraically solve the equation $\frac{x}{x-6} + \frac{1}{x+1} = \frac{42}{x^2 - 5x - 6}$ for x. Show your steps (5 pts)

4. Evaluate the following limits using the given graph of $h(x)$. (3 pts)



a. $\lim_{x\to\infty} h(x) =$ _____ **b.** $\lim_{x\to -2^+} h(x) =$ _____

c. $\lim_{x\to -2^-} h(x) =$ _____

5. For the rational function $f(x) = \dfrac{-3(x-5)(x-1)}{(x+4)(x+2)(x-1)}$,

find the domain, vertical asymptotes, holes, and zeros. (If the function does not have a feature, write "none"). (8 pts)

Domain: _____

Equation of vertical asymptote(s): _____

Coordinates of hole(s): _____

x-coordinate of zero(s): _____

6. Evaluate the logarithms algebraically showing all work. (7 pts)

a. $\log_3 27$ **b.** $\log_9 \sqrt{3}$ **c.** $3\log_4 16 - \log_4 4$

7. The population of a city is now 6150 and is growing exponentially at a rate of 1.2% per year.

a. Write an equation that models the future population *P(t)* for any year *t*. (2 pts)

b. What will the population be in 10 years? (2 pts)

a. Assuming this growth rate continues, when will the population reach 8000? Solve algebraically and show all work. Do not use the graphing feature of your calculator. Round to the nearest hundredth. (3 pts)

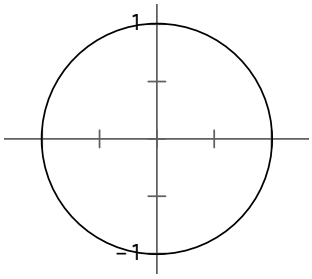
8. Solve the following equations algebraically. Show all work. (9 pts)

a. $\log(3x) + \log(x-4) = \log 15$

b. $4\log_2(x+2) - 1 = 7$

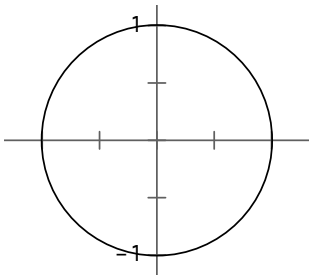
9. Without using a calculator, draw a picture and solve the following equations for x. Find <u>all solutions</u> for the interval $0° \le x \le 360°$. (9 pts)

a. $\sin x = -\frac{\sqrt{2}}{2}$



$x =$ _____

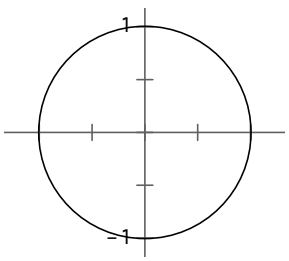
b. $4\cos^2 x - 3 = 0$



$x =$ _____

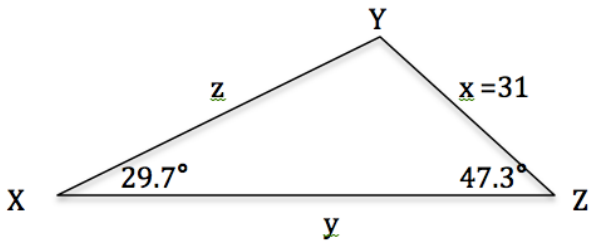
10. Without using a calculator, draw a picture and find the values of the following. (3 pts)

$\cos\frac{5\pi}{6} =$ _____ and $\sin\frac{5\pi}{6} =$ _____.

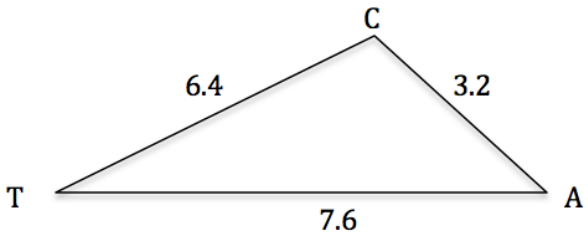


11. Solve each of the following problems. Answers should be rounded to two decimal places. **Check your calculator mode.**

a. In ΔXYZ, side $x = 31$, $\angle X = 29.7°$, $\angle Z = 47.3°$. Find the length of side z. (4 pts)



b. In ΔCAT, side $\overline{CT} = 6.4$, $\overline{CA} = 3.2$, and $\overline{AT} = 7.6$. Find the measure of $\angle A$. (Give your answer in degrees.) (4 pts)

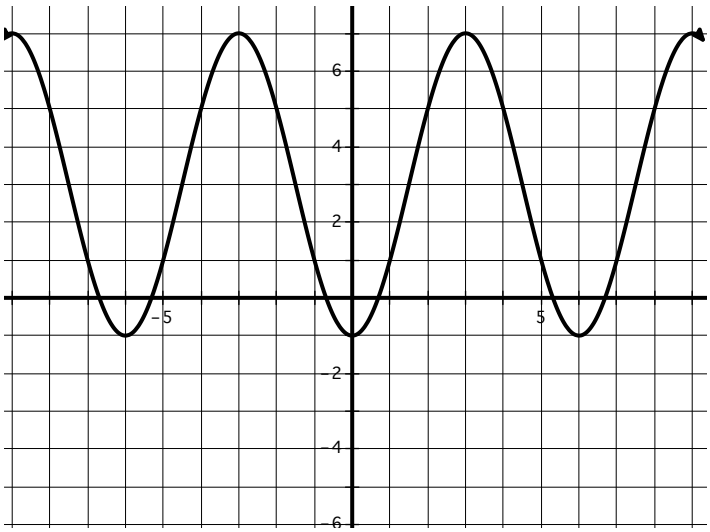


12. Find a sequence of transformations that transforms the graph of $f(x) = \frac{1}{x}$ into the graph of $g(x) = 5 + \frac{2}{x-4}$.

Describe each transformation geometrically. (Use words such as translate, reflect, stretch, shrink, rotate, etc.) (3 pts)

1st transformation:
2nd transformation:
3rd transformation:

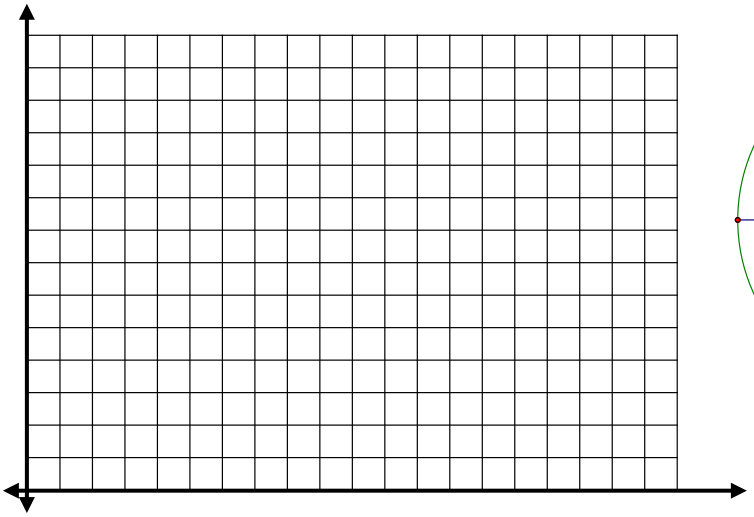
13. Find a sinusoidal function formula for the graph below. (5 pts)

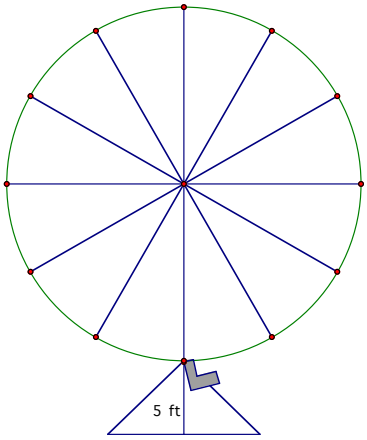


(Optional- Not Graded)
Helpful Numbers
Min =
Max =
Midline =
Amplitude =
Period =

Answer:_____

14. The path of a rider on the Ferris Wheel shown below can be modeled with a sinusoidal function. This wheel has a loading dock that is 5 feet off the ground. The rider starts at the 3:00 position on the wheel, which has a radius of 20 feet, and travels counter-clockwise at a rate of 1 rotation every 24 minutes**.** **(Change your calculator mode to RADIANS.)**





(Optional- Not Graded)
Helpful Numbers
Min =
Max =
Midline =
Amplitude =
Period =

a. Graph the rider's height from the ground, verses time, for 2 periods. Show the scale on the *x*- and *y*-axes and make sure your points are clearly marked. (5 pts)

b. Write an equation for this sinusoidal function. (4 pts)

Answer:_____

c. Use your equation to find the first time a rider is 40 feet above the ground. Round your answer to the nearest hundredth. Show work. (3 pts)