FAIRFIELD HIGH SCHOOL
DEPT. OF MATHEMATICS
PRECALCULUS – FINAL EXAM REVIEW

1. Solve for x: $2\sin x + 1 = 0$ for $0 \le x \le 2\pi$.

2. The revenue function for a given commodity is $r(x) = 150x - 2x^2$. Find the value of x that will maximize the revenue.

3. The terminal side of an angle passes through the point (8,-15). Find the cosine of this angle.

4. The equation for a harmonic motion is given by: $d(t) = 9\sin 4t$. What is the amplitude, and frequency in oscillation per second?

5. Given: $f(x) = \ln(x)$. This curve is subjected to three transformations. The curve is shifted up 5 units, horizontally 2 to the right, and then stretched vertically by a factor of 9. What is the equation of this new graph?

6. Find the domain for the following function: $f(x) = \log_4(\sqrt{2x+6})$.

7. Given the following function: $f(x) = (\frac{x+2}{5})^3 - 7$. Find $f^{-1}(x)$.

8. A rectangle is inscribed in the parabola whose equation is: $y = 21 - x^2$ with the base of the rectangle on the x-axis. Represent the area of this rectangle as a function of x.

9. The graph of a particular relation is symmetric with the x-axis. If (-7,9) is on the graph of this relation, what is the image point of the given point?

10. Determine "end behavior" of the following function: $f(x) = -x^3(x^2+1)(x+8)$.

11. Graph the following polar function: $r(\theta) = 4(1 - \cos\theta)$.

12. Using the following parametric equations: $x = t^3 - 5$ and $y = 9 + t$, eliminate the parameter t, and write the rectangular equation relating x and y.

13. Write a cubic equation, with real coefficients, having zeros of $2i$ and -4.

14. In triangle PQR, $p=12$, $q=16$, and $R=30°$. Find the area of the triangle.

15. Given the following function: $f(x) = 6\cos(4x - \frac{\pi}{3})$. Determine the amplitude, frequency, period, and phase shift for this function.

16. In triangle *KMT*, $K=72^\circ$, $m=19.4$, and $t=26.3$, find the value of k.

17. In triangle *DEF*, $D=39^\circ$, $E=47^\circ$, *and* $e = 112$, find the value of d.

18. If $f(x) = 3x^4 + 2x^2 - 10x + 5$ is divided by $x+2$, find the quotient and remainder.

19. For the following function: $f(x) = 2x^3 - 24x + 10$, find the coordinates of all the local maxima and minima.

20. Solve the following inequality: $\frac{x+9}{x-3} \geq 0$.

21. Interest is compounded continuously at a rate of 3.7% a year. How long will it take to double the money invested?

22. Solve: $|x+5| \leq 12$.

23. Solve for x: $4x^2 \geq 21x + 18$.

24. Simplify: $e^{3\ln R}$.

25. A radioactive element has a half-life of 5 days, where the decay equation is: $y = y_0 e^{-kt}$. Find the value of k.

26. Given the following exponential equation: $5000 = 3000(1.045)^t$. Convert this to a logarithmic equation.

27. Solve for t: $\sqrt[3]{16} = 2^t$.

28. Solve for x: $\log_5(.04) = x$

29. Find the equation of the oblique asymptote for the following rational function: $f(x) = \frac{2x^2 - 4x + 3}{x - 5}$.

30. Solve for x: $\log_x(\frac{1}{32}) = -5$

~~31~~. Find $\lim_{x \to \infty} \frac{3x^2+9x-1}{x^2+6}$

32. Solve for x: $2^{2x-1}=128$

~~33~~. Given the following function: $f(x)\frac{2x^2+3x-1}{x^2-2x-35}$.

34. List all the possible rational zeros of: $f(x)=3x^4-9x^2+2x-10$.

35. An investment of $7000 is made at a bank paying 4.25%/yr compounded monthly. If this is left untouched for 6 years, how much is this investment now worth?

36. Given the following function: $f(x)=5(\frac{x-2}{7})^3+6$. Find $f^{-1}(x)$.

37. Graph the following "piecewise" function:

$f(x)=\ln(x-2)$ for $x \succ 3$

$f(x)=x^2-9$ for $x \leq 3$

38. If $ln5=p$ and $ln3=q$, express $\log_3 5$ in terms of p and q.

39. Given the following data set:

t	0	3	6	9	12	15
f(t)	20	31	28	24	22	21

Logistic Reg. Eq

By graphing; show that $f(t)=20+10te^{-\frac{t}{3}}$ is a good "fit."

~~40~~. Find the fifth term in the expansion of: $(k^3-4m^2)^7$.

41. If $\sin\theta \geq 0$ and $\tan\theta \prec 0$, determine the quadrant of angle θ.

42. An airplane has an airspeed of 600 mph in a northeasterly direction. A wind of 70 mph is directed due south. Find the groundspeed and direction of the plane.

43. A rumor is spreading according to the following equation: $y = \frac{e^{2t}}{e^{2t}+9}$ where y is the percent of people who have heard the rumor. What % of the population knows this rumor at time t=0? What % after 10 days? How long before ½ the population knows this rumor?

44. Use the parametric equations for projectile motion with $v_0 = 70$, $h_0 = 4$, and $\theta = 30°$. When will the ball land? How far down range will it land? What will be the maximum height of the ball?

45. Using the method of partial fractions decompose: $\frac{-x-31}{x^2-3x-40}$.

46. If $\tan\theta = 2.5$ and $\cos\theta < 0$, find all 6 trig functions of θ.

47. Find all real zeros of the given function:
$f(x) = 1.1x^5 - 1.73x^4 - 17.2x^3 + 30.9x - 9.1$.

48. Evaluate: i^{82}.

49. If $\sin x = \frac{3}{5}$ in Quadrant I, and $\cos y = \frac{5}{12}$ in Quadrant II, find *tan(x+y)*.

50. Find the exact value of $\sec(Tan^{-1}(\frac{7}{4}))$.

51. Solve, correct to two decimal places: $\sin x = e^{-x}$, $0 \le x \le 2\pi$.

52. Solve: $2 - x^3 = \tan x$, where *0<x<1*.

53. Given these parametric equations: *x=5sint* and *y=4cost,* find the rectangular equation for this set of parametrics.

54 Given the following equation: $x^2 = 2^x$. This equation has 3 solutions. Find all of them.

55. The angle of depression from the top a hill to a point 113 feet from the base of the hill is $52°$. Find the height of the hill.

56. Solve the following equation: $7^x = 200$.

57. Determine the following product: *(4+3i)(5-2i).*

Precalculus Exam Review
Answers

NOTE: Skip #31, #33 "Find the asymptotes.", #49 $\cos y = -5/13$

1. $\pi/6, 11\pi/6$
2. 375
3. $8/17$
4. amp = 9, freq = $2/\pi$
5. $f(x) = 9\ln(x-2)+5$
6. $x > -3$
7. $f^{-1}(x) = 5\sqrt[3]{x+7} - 2$
9. $(-7,-9)$
10. as $x \to -\infty$, $y \to -\infty$
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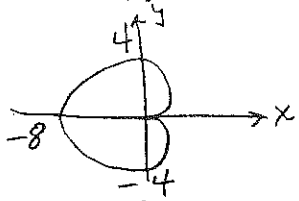
11. 

12. $x = (y-9)^3 - 5$
13. $x^3 + 4x^2 + 4x + 16 = y$
14. 48
15. amp = 6, per = $\pi/2$, p.s. = $\pi/12$ right
16. 27.436
17. 96.375
18. Q: $3x^3 - 6x^2 + 14x - 38$ R: 81
19. max: $(-2, 42)$ min: $(2, -22)$
20. $(-\infty, -9] \cup (3, \infty)$
21. 18.734 years
22. $-17 \le x \le 7$
23. $\left(-\infty, -3/4\right] \cup [6, \infty)$
24. R^3
25. 0.139
26. log 5000 = log 3000 + t log 1.045
27. $t = 4/3$ 8. $A(x) = 2x(21 - x^2)$
28. -2
29. y = 2x + 6
30. x = 2
31. (skip)
32. x = 4
33. Vertical asymptote: x = -5, x = 7
    Horizontal asymptote: y = 2
34. $\left\{\pm 1, \pm 2, \pm 5, \pm 10, \pm 1/5, \pm 2/3, \pm 5/3, \pm 10/3\right\}$
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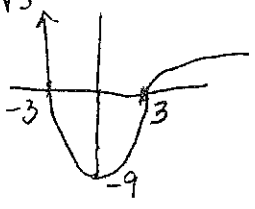
37. 

38. p/q
39.
40. $8960k^9m^8$

41. Q II

42. speed = 552.723 mph, 39.862° N of E

43. t = 0, 10%; t = 10, 100%; t = 1.098, 50%

44. land @ t = 2.296, dist = 139.210, max = 23.141

45. $\frac{-3}{x-8}+\frac{2}{x+5}$

46. $\cot\theta=\frac{2}{5}$, $\sin\theta=\frac{-5}{\sqrt{29}}$, $\cos\theta=\frac{-2}{\sqrt{29}}$

$\csc\theta=\frac{-\sqrt{29}}{5}$, $\sec\theta=\frac{-\sqrt{29}}{2}$

47. -2.650, -1.889, 0.312, 1.136, 4.665

48. -1

49. $-33/56$

50. $\sqrt{65}/4$

51. 0.59, 3.10

52. 0.902

53. $\frac{x^2}{25}+\frac{y^2}{16}=1$

54. -0.767, 2, 4

55. 144.633 ft

56. 2,723

57. 26 + 7i

1a key

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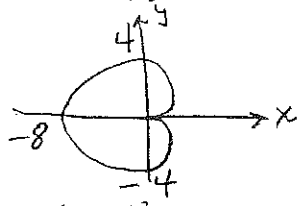
11. 

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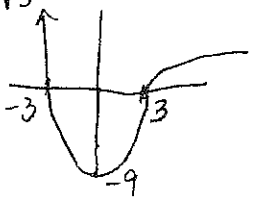
37. 

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