Name _____

Review Packet for Incoming Pre-Calculus Honors

SHOW ALL WORK!

Part 1: Algebra

Perform the indicated operations. Write the resulting polynomial in standard form.

1. $-(5x^2 - 1) - (-3x^2 + 5)$

2. $(x - 3 + y)(x - 3 - y)$

3. $(2x^3 - 3)^2$

4. $-3^2 - (-4x)^2$

Factor each expression completely.

5. $2x^3 - 6x$

6. $(x - 1)^2 - 4$

7. $9x^2 - 12x + 4$

8. $4x^2 - 23x - 6$

9. $9x^2 - 3x + 2$

10. $5x^2 + 26x + 5$

11. $9x^2 - 36$

12. $16 + 6x - x^2$

13. $2x^3 - x^2 - 6x + 3$

Given $f(x) = -x^2 + 3$ and $g(x) = 3x - 2$, simplify each of the following:

14. $f + g$

15. $f - g$

16. $f \cdot g$

17. $f \circ g$

18. $g \circ f$

19. f/g

20. $f^{-1}(x)$

21. $g^{-1}(x)$

22. $f(g(2))$

23. $g(f(-3))$

Solve each quadratic equation ***Twice***:

(a) by factoring (when possible)

(b) by quadratic formula

23. $x^2 + 6x - 16 = 0$

24. $2x^2 + 6x + 7 = 0$

25. $0 = 3x - 2x^2 + 20$

Simplify each expression. Express each answer in standard radical form.

26. $\sqrt{54xy^4}$

27. $\sqrt[3]{16x^5}$

28. $5\sqrt{x} - 3\sqrt{x} + 6\sqrt{y}$

29. $2\sqrt{50} + 12\sqrt{8}$

30. $\left(5 + 2\sqrt{3}\right)\left(5 - 2\sqrt{3}\right)$

31. $(2 - \sqrt{3})(3 - \sqrt{6})$

Rationalize the denominator.

32. $\frac{2}{\sqrt{6}}$

33. $\frac{1}{2+\sqrt{3}}$

34. $\frac{5}{2\sqrt{10}-5}$

Simplify each expression. Express all answers with positive exponents.

36. $\frac{25x^8}{10x^4}$

37. $\left(\frac{4}{y}\right)^3 \left(\frac{3}{y}\right)^2$

38. $(4x)^{-2}(8x^4)$

39. $(2x^5)^0$

39. $\left(\frac{2a^2b^4}{3a^3b}\right)^{-3}$

40. $(25x^2y^4)^{-\frac{1}{2}}$

Simplify each expression:

41. $\frac{x+1}{(x-1)^2}+\frac{x-2}{x-1}$

42. $\frac{2}{x+2}-\frac{6}{x-2}$

43. $\frac{4x^2+20x}{9-6x-3x^2}\div\frac{x+5}{x^2-9}$

44. $\frac{6x}{3x-1}-\frac{4x}{2x+5}$

45. $\frac{1}{1+\frac{1}{x}}+\frac{1}{1-\frac{1}{x}}$

Solve each equation.

46. $\frac{x+3}{2x}=\frac{5}{8}$

47. $\frac{5}{x+2}+\frac{x}{2}=\frac{4}{3}$

48. $\frac{x-4}{x+2}+\frac{2}{x-2}=\frac{17}{x^2-4}$

49. $\frac{x+2}{2x-3}+\frac{x-2}{x+1}=\frac{21}{2x^2-x-3}$

50. $3+\sqrt{x+1}=2x$

51. $4\sqrt{x-3}=8$

Simplify each expression.

52. $(2+3i)-(-4-2i)$

53. $(2+3i)(-4-2i)$

54. i^{101}

55. $\frac{2+i}{-3i+1}$

Solve each system of equations:

56. $\begin{cases} y=8-x \\ \frac{1}{2}y-x=\frac{5}{2} \end{cases}$

57. $\begin{cases} 2x-3y=3 \\ 4x+2y=14 \end{cases}$

Part 2: Trigonometry

Determine the **EXACT** value of each WITHOUT the use of a calculator:

1. $\cos\frac{3\pi}{2}$
2. $\cot 135°$
3. $\sin\left(-\frac{\pi}{6}\right)$
4. $\csc\frac{2\pi}{3}$
5. $\tan\frac{5\pi}{3}$
6. $\sec\pi$
7. $\cos\frac{7\pi}{6}$
8. $\sec\frac{5\pi}{4}$
9. $\tan\left(-\frac{5\pi}{6}\right)$

Given $0 \leq \theta < 2\pi$, determine the **EXACT** values of θ WITHOUT using a calculator: (Answer in Radians)

10. $\sin\theta = -\frac{1}{2}$
11. $\cos\theta = \frac{\sqrt{2}}{2}$
12. $\cot\theta = \frac{\sqrt{3}}{3}$
13. $\tan\theta = -1$

14. $\csc\theta = \sqrt{2}$

15. $\sec\theta = -2$

16. $\cot\theta = 0$

17. $\csc\theta$ is undefined

Determine the **EXACT** value of each expression without using a calculator.

18. $\sec^{-1} 1$

19. $\operatorname{arccsc}\frac{2\sqrt{3}}{3}$

20. $\cot^{-1}(-1)$

21. $\sin^{-1}\left(-\frac{\sqrt{2}}{2}\right)$

22. $\arccos\left(-\frac{1}{2}\right)$

23. $\tan^{-1}\left(\tan\frac{\pi}{3}\right)$

24. $\csc\left(\cos^{-1}\left(-\frac{7}{25}\right)\right)$

25. $\cot\left(\sin^{-1}\left(\frac{3}{4}\right)\right)$

Use a calculator to evaluate each expression:
Round answers to the nearest ten-thousandth.

26. $\cos\frac{5\pi}{7}$

27. $\sin 2$

28. $\tan 103°$

29. $\csc 42°$

30. $\sec\left(-\frac{5\pi}{7}\right)$

31. $\cot 1.3$

Use a calculator to evaluate each expression:
Round answers to the nearest hundredth of a radian.

32. $\sin^{-1} 0.3325$

33. $\operatorname{arccot} 1.792$

34. $\sec^{-1}(-0.2383)$

35. $\csc^{-1} 3$

Part 3: Graphing

Graph each equation on a separate sheet of paper.
Label the *x* and *y*-intercepts and all of the important points on each graph.
Identify the Domain and Range

1. $f(x) = -2\cos x$

2. $f(x) = \cot x + 1$

3. $f(x) = \sin\frac{1}{2}x$

4. $f(x) = \sec(x - \frac{\pi}{2})$

5. $f(x) = \tan 2x$

6. $f(x) = 3\csc x - 2$

7. $f(x) = [\![x]\!] - 1$

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

10. $f(x) = \sqrt{-x}$

11. $y = -3x^2 + 6x - 9$

12. $f(x) = x^2 + 3$ and $f^{-1}(x)$

13. $f(x) = \begin{cases} -2 & x < 0 \\ x + 1 & 0 \le x < 10 \\ -\frac{1}{2}x + 16 & x \ge 10 \end{cases}$