Bergen Catholic PreCalculus Summer Packet

Instructions:

- Students entering PreCalculus CP in September, must complete questions #1-20
- Students entering PreCalculus Honors in September, must complete questions #1-40
- Students entering PreCalculus High Honors in September, must complete questions #1-100
    - There will be a two review tests at the start of the year: Test #1 (based on #1-60) after the 1st week and Test #2 (based on #61-100) after the 2nd week.
    - Make sure you are taking the Summer Packet questions seriously as you prepare for these Review Tests!

PreCalc Ch0 Preview

Simplify.

1) $(-6 + 4i) - (1 + 6i)$

2) $(3 + 7i) + (-3 - 5i)$

3) $(-8 - 6i)^2$

4) $(6 + 6i)(-7 - 5i)$

5) $\dfrac{-8 + 6i}{10 + 10i}$

6) $\dfrac{4 + i}{-4 + 2i}$

Solve each equation by factoring.

7) $x^2 + 2x = 24$

8) $n^2 + 30 = -11n$

9) $3p^2 = -16p - 21$

10) $14n^2 + 79n = -72$

Solve each equation by completing the square.

11) $a^2 - 14a + 66 = 6$

12) $8n^2 - 16n - 54 = -4$

Solve each equation with the quadratic formula.

13) $4m^2 = -6m + 70$

14) $8x^2 = 21 + 5x$

Simplify.

15) $\sqrt[4]{243}$

16) $\sqrt[4]{112}$

Solve each system by elimination.

17) $3x + 3y = -9$
$-6x - 9y = 15$

18) $-6x + 5y = -15$
$12x + 10y = -30$

Solve each system by substitution.

19) $4x - 4y = -8$
$y = -4x - 8$

20) $3x + 5y = -1$
$y = -8x + 22$

PreCalc Ch1 Preview

Describe the transformations necessary to transform the graph of $f(x)$ into that of $g(x)$.

21) $f(x) = |x|$
$g(x) = -|2(x-3)| + 1$

22) $f(x) = x^3$
$g(x) = -2(x-2)^3 + 1$

For each problem, find the average rate of change of the function over the given interval.

23) $f(x) = 2x^2 + 2; \quad [1, \frac{4}{3}]$

24) $f(x) = 2x^2 + x - 1; \quad [-1, -\frac{1}{2}]$

Perform the indicated operation.

25) $g(x) = -3x - 3$
$f(x) = x^3 + x$
Find $g(f(x))$

26) $f(a) = a + 1$
$g(a) = a^2 - 3a$
Find $f(g(a))$

27) $f(x) = 2x + 4$
$g(x) = x^2 - 4x$
Find $f(g(10))$

28) $g(x) = x + 4$
$h(x) = x^2 - 4x$
Find $g(h(10))$

Find f and g so that $h(x) = f(g(x))$. Neither function may be the identity function $f(x) = x$.

29) $h(x) = 4^{\frac{x}{2} - 2}$

30) $h(x) = 5^{3x-5}$

Find the inverse of each function.

31) $f(x) = -1 + \frac{5}{2}x$

32) $h(x) = \frac{5}{4}x - \frac{15}{4}$

33) $f(x) = \sqrt[5]{x-2} - 2$

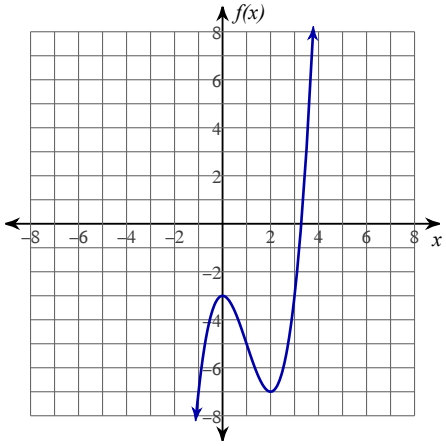
34) $f(x) = \sqrt[3]{x-3} + 1$

35) $f(x) = -\frac{2}{-x-2}$

36) $g(x) = \frac{2}{x-2}$

Approximate all points of relative extrema of each function. Then approximate the open intervals where each function is increasing and decreasing.

37)



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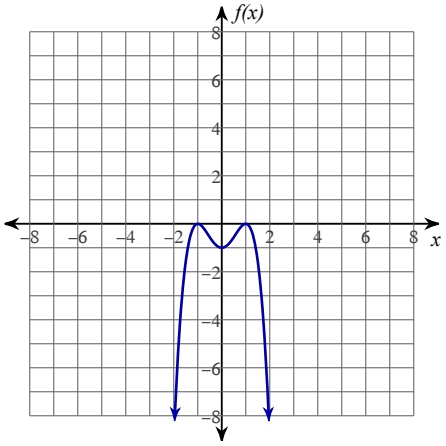


Use a graphing calculator to approximate all points of relative extrema of each function. Then approximate the open intervals where each function is increasing and decreasing.

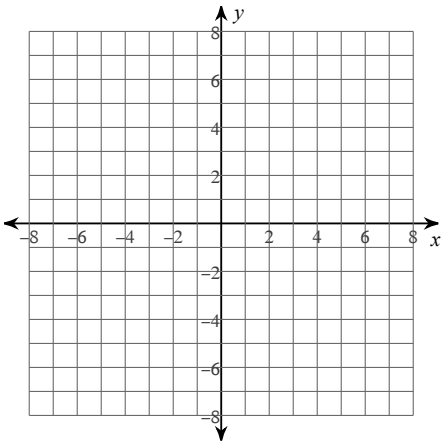
39) $f(x) = -x^4 + 2x^2 - 2$

40) $f(x) = -x^4 + 2x^2 - 1$

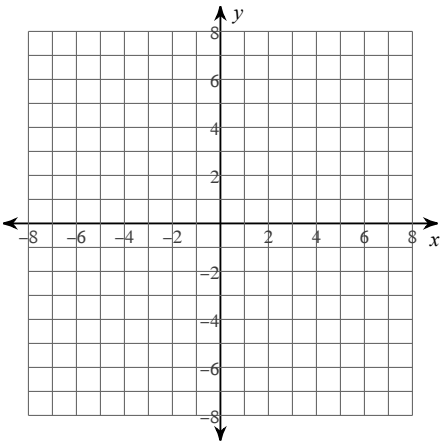
PreCalc Ch2 Preview

Identify the domain and range of each. Then sketch the graph.

41) $y = 3\sqrt{x-2} - 1$



42) $y = -5 + 2\sqrt{x+5}$



Solve each equation. Remember to check for extraneous solutions.

43) $10 + \sqrt{81x} = 19$

44) $\sqrt{k+9} = \sqrt{-7-k}$

45) $k = \sqrt{-60 + 16k}$

46) $x - 7 = \sqrt{29 - 5x}$

Divide. Write your answer in fraction form.

47) $(8x^4 + 9x^3 - 18x^2 - 4x + 5) \div (x + 2)$

48) $(4x^4 - 4x^3 - x^2 + 4x - 5) \div (x - 1)$

49) $(9x^4 - 28x^3 - 5x^2 - 20x + 26) \div (x^2 - 4x + 2)$

Write a polynomial function of least degree with integral coefficients that has the given zeros.

50) $-\frac{5}{3},\ 1,\ 5,\ -2$

51) $2\sqrt{2},\ -1 + \sqrt{10}$

52) $2i,\ -1 - 2i$

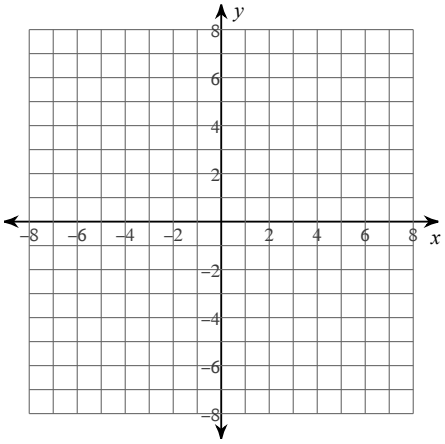
Find all zeros.

53) $f(x) = 4x^3 - 4x^2 - x + 1$

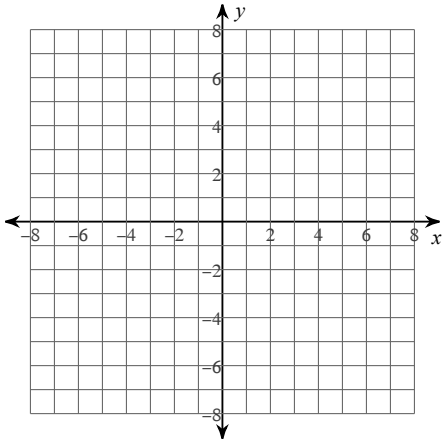
54) $f(x) = 5x^3 + x^2 - 5x - 1$

Graph each function.

55) $f(x) = \dfrac{x^3 - 3x^2 - 4x}{-3x^2 + 3x + 18}$



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



Solve each equation. Remember to check for extraneous solutions.

57) $\dfrac{1}{5v + 1} - \dfrac{1}{5v^2 + v} = \dfrac{6}{5v^2 + v}$

58) $\dfrac{3}{a + 6} + \dfrac{a^2 + 7a + 10}{a + 6} = a - 5$

Solve each inequality.

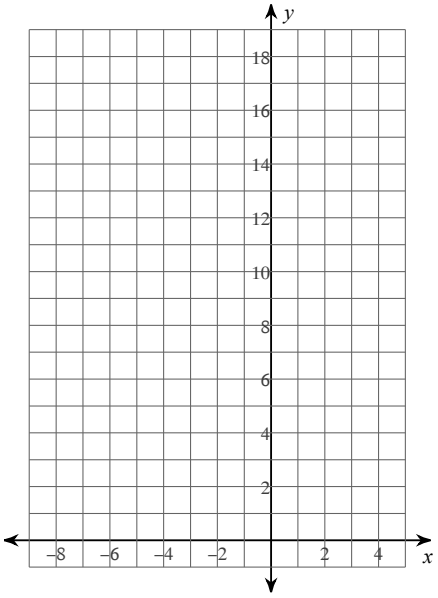
59) $-2x^3 + 39x^2 - 240x + 448 \geq 0$

60) $-2x^3 + 17x^2 + 2x - 80 \geq 0$

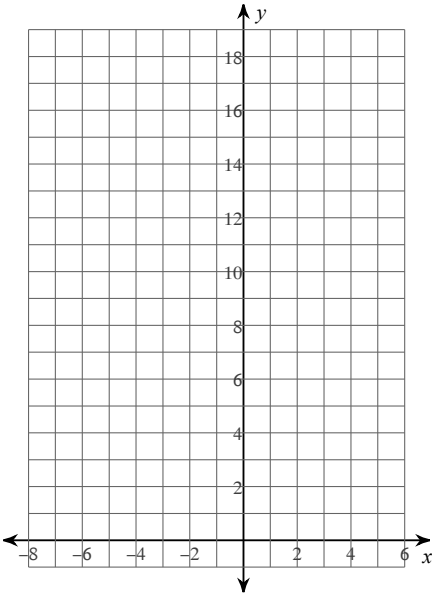
PreCalc Ch3 Preview

Sketch the graph of each function.

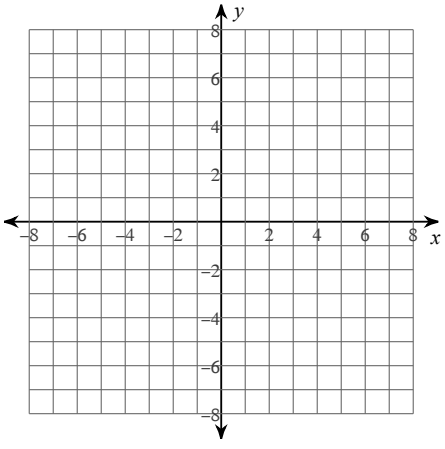
61) $y = \frac{1}{2} \cdot \left(\frac{1}{5}\right)^{x+2} - 1$



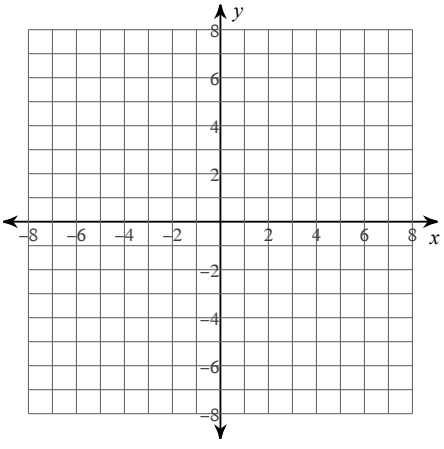
62) $y = 5 \cdot \left(\frac{1}{2}\right)^{x+1} - 1$



63) $y = \log_3 (x + 2)$



64) $y = \log_2 (x - 1)$



Solve each continous exponential growth/decay problem.

65) For a period of time, an island's population grows exponentially. If the continuous growth rate is 2% per year and the current population is 1,036, what will the population be 10 years from now?

66) For a period of time, E. coli bacteria in a culture grows exponentially. If the population was 109.6 million 10 minutes ago and the current population is 148.0 million, what will the population be 9 minutes from now?

Expand each logarithm.

67) $\log_4 \left(a \cdot b \cdot d \cdot c^3\right)$

68) $\log_3 \left(yz^2\sqrt{x}\right)$

Condense each expression to a single logarithm.

69) $\log_8 w + \dfrac{\log_8 x}{2} + \dfrac{\log_8 y}{2} + \dfrac{\log_8 z}{2}$

70) $\log_4 y + 5\log_4 z + \dfrac{\log_4 x}{3}$

Use the properties of logarithms and the logarithms provided to rewrite each logarithm in terms of the variables given.

71) $\log_4 10 = A$
$\log_4 11 = B$
$\log_4 6 = C$
Find $\log_4 \dfrac{1}{484}$

72) $\log 4 = X$
$\log 6 = Y$
$\log 7 = Z$
Find $\log \dfrac{50}{21}$

Solve each equation.

73) $\left(\frac{1}{7}\right)^{2k} = 49$

74) $\left(\frac{1}{64}\right)^{2v} = 8$

75) $64^{v} \cdot \left(\frac{1}{16}\right)^{1-v} = 1$

76) $4 \cdot \left(\frac{1}{16}\right)^{3-2r} = 32^{r}$

77) $\log_{16} x = \log_{16} 22$

78) $\log_{14}\left(b^2 - 4b\right) = \log_{14}\left(16 + 2b\right)$

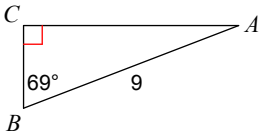
79) $\log_{7}\left(x + 6\right) - \log_{7}\left(x + 4\right) = 1$

80) $\log_{8}\left(x + 6\right) + \log_{8}\left(x + 18\right) = 2$

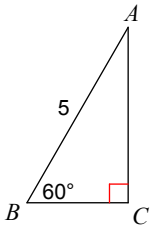
PreCalc Ch4 Preview

Solve each triangle. Round answers to the nearest tenth.

81)



82)



Convert each degree measure into radians.

83) 330°

Convert each radian measure into degrees.

84) $\frac{5\pi}{3}$

Find a coterminal angle between 0° and 360°.

85) 570°

Find a coterminal angle between 0 and 2π for each given angle.

86) $-\frac{25\pi}{9}$

Find the exact value of each trigonometric function.

87) $\sin 0$

88) $\cos \frac{7\pi}{4}$

89) $\tan \frac{7\pi}{6}$

Use the given point on the terminal side of angle θ to find the value of the trigonometric function indicated.

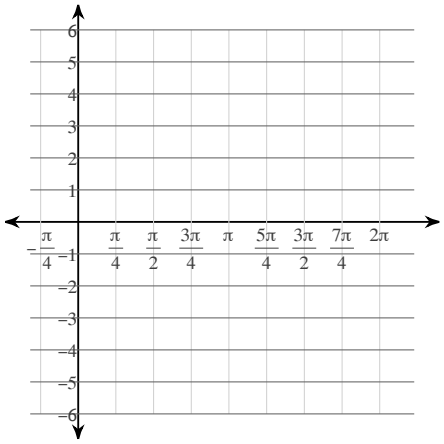
90) $\csc \theta; (11, 2)$

91) $\sec \theta; (\sqrt{7}, -3)$

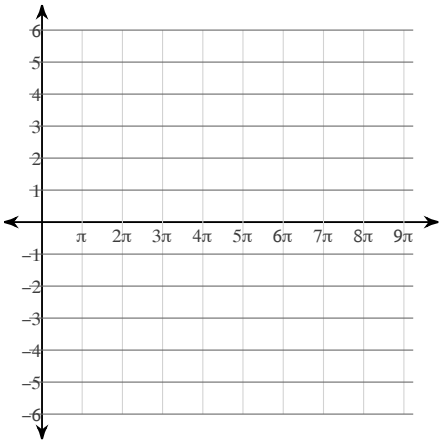
92) $\cot \theta; (-8, -\sqrt{17})$

Graph each function using radians.

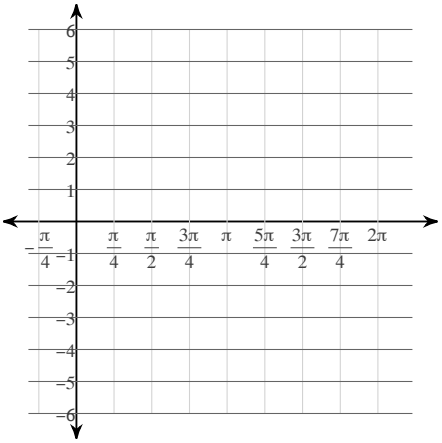
93) $y = 3\sin 3\theta - 1$



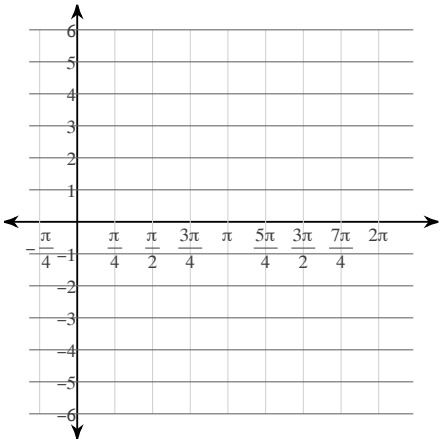
94) $y = 3\cos\dfrac{\theta}{3} - 1$



95) $y = 3\tan\theta - 2$



96) $y = 2\sec 2\theta - 1$



Solve each triangle. Round your answers to the nearest tenth.

97) $m\angle B = 38°$, $m\angle C = 84°$, $a = 29$

98) $m\angle A = 17°$, $c = 34$, $a = 32$

99) $c = 13$, $m\angle A = 41°$, $b = 29$

100) $a = 20$, $b = 29$, $c = 12$