Review for Fall Final Exam

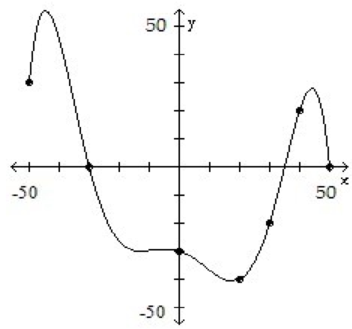
Entire Review must be completed with a passing grade in order to be eligible for a retest. Due on day of final exam. ***<u>ALL PROBLEMS ARE TO BE WORKED ON SEPARATE PAPER. NO WORK NO CREDIT!</u>***

Find the value for the function.

1. Find f(4) when $f(x) = x^2 + 5x - 1$ 2. Find $f(x + h)$ when $f(x) = 3x^2 - 4x - 4$

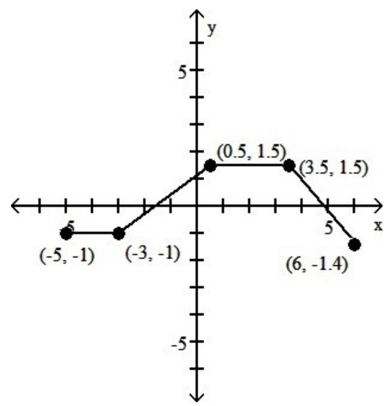
The graph of a function f is given. Use the graph to answer the question. Use the graph of f given below to find

3.
a) f(20).
b) Is f(-50) positive or negative?
c) What is the domain of f?
d) For what numbers is f(x)≤0?



The graph of a function is given. Determine whether the function is increasing, decreasing, or constant on the given interval.

4. a) (-3, 0.5)
b) (0.5, 3.5)
c) (3.5, 6)



Write the equation of a function that has the given characteristics.

5. The graph of $y = x^2$, shifted 6 units upward

Graph the function by starting with the graph of the basic function and then using the techniques of shifting, compressing, stretching, and/or reflecting.

6. $f(x) = (x+3)^2 + 3$

Use the graph of $f(x) = x^2$ to sketch the graph of the indicated equation.

7. $y = -\frac{1}{3}(x+5)^2 + 2$

Use transformations of the graph of $y = x^4$ or $y = x^5$ to graph the function.

8. $f(x) = (x-5)^4$ **9.** $f(x) = (x-4)^5 + 4$

Form a polynomial whose zeros and degree are given.

10. Zeros: -3, -2, 3; degree 3 **11.** Zeros: -4, -2, 2; degree 3

For the polynomial, list each real zero and its multiplicity. Determine whether the graph crosses or touches the x-axis at each x -intercept.

12. $f(x) = 3(x+1)(x+2)^3$ **13.** $f(x) = 2(x^2+3)(x+1)^2$

Use the Factor Theorem to determine whether x - c is a factor of f(x).

14. $f(x) = x^3 + 4x^2 - 10x + 12; \ x + 6$

List the potential rational zeros of the polynomial function. Do not find the zeros.

15. $f(x) = -2x^3 + 2x^2 - 4x + 8$

Information is given about a polynomial f(x) whose coefficients are real numbers. Find the remaining zeros of f.

16. $Degree\ 3; \ zeros: 3, \ 4 - i$

Find the vertical asymptotes of the rational function.

17. $f(x) = \frac{x+7}{x^2-64}$

Give the equation of the oblique asymptote, if any, of the function.

18. $f(x) = \frac{x^2+3x-5}{x-7}$

Solve the inequality algebraically. Express the solution in interval notation.

19. $x^3 - 6x^2 > 0$ **20.** $\frac{x-1}{x+2} < 0$

Determine algebraically whether the function is even, odd, or neither.

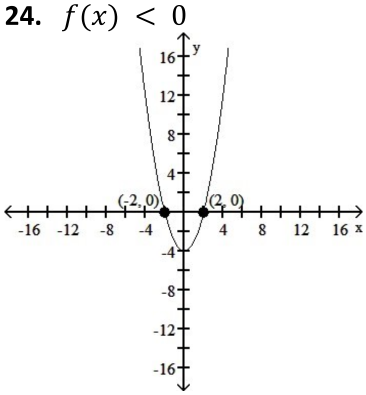
21. $f(x) = -4x^2 + 3$ 22. $f(x) = 3x^3 + 9$

Use a graphing utility to graph the function over the indicated interval and approximate any local maxima and local minima. Determine where the function is increasing and where it is decreasing. If necessary, round answers to two decimal places.

23. $f(x) = x^3 - 4x^2 + 6; \ (-1, 4)$

Use the figure to solve the inequality.

24. $f(x) < 0$



Determine the maximum number of turning points of f.

25. $f(x) = (x-2)^2(x+5)^2$

Decide whether the composite functions, f ∘ g and g ∘ f, are equal to x.

26. $f(x) = x^2 + 3, \ g(x) = \sqrt{x} - 3$

For the given functions f and g, find the requested composite function.

27. $f(x) = 6x + 7, \ g(x) = 2x - 1; \quad Find\ (f \circ g)(x).$

Find functions f and g so that f ∘ g = H.

28. $H(x) = \frac{5}{\sqrt{8x+5}}$

Indicate whether the function is one-to-one.

29. $\{(3,-8), (-9,-2), (20,8)\}$

30. $\{(-7,-18), (8,-18), (-1,1)\}$

Convert the angle to D° M' S'' form. Round the answer to the nearest second.
31. 178.53°
Convert the angle to a decimal in degrees. Round the answer to two decimal places.
32. 21°17'34''
Convert the angle in degrees to radians. Express the answer as multiple of π.
33. 135°
Convert the angle in radians to degrees.
34. $\frac{12\pi}{7}$
If A denotes the area of the sector of a circle of radius r formed by the central angle θ, find the missing quantity. If necessary, round the answer to two decimal places.
35. r = 20 inches, θ = $\frac{\pi}{3}$ radians, A = ?
36. θ = $\frac{\pi}{3}$ radians, A = 75 square meters, r = ?
Solve the problem.
37. A gear with a radius of 8 centimeters is turning at $\frac{\pi}{11}$ radians/sec. What is the linear speed at a point on the outer edge of the gear?
38. A wheel of radius 5.2 feet is moving forward at 18 feet per second. How fast is the wheel rotating?
In the problem, t is a real number and P = (x, y) is the point on the unit circle that corresponds to t. Find the exact value of the indicated trigonometric function of t.
39. $\left(\frac{3}{8}, \frac{\sqrt{55}}{8}\right)$ Find sin t.
40. Find the exact values. Do not use a calculator.
a) cos $\frac{\pi}{2}$
b) cos 0
c) csc $-\frac{\pi}{2}$
d) sec $\frac{\pi}{4}$
e) csc 45°
f) cot 45°
g) cos 60°
h) sec $\frac{\pi}{6}$
Use transformations to graph the function, label key points and intercepts.
41. $y = \cos\left(x - \frac{\pi}{3}\right)$
42. $y = 3\cos x - 2$
Find (i) the amplitude, (ii) the period, and (iii) the phase shift.
43. $y = -\frac{1}{2}\cos(2x - 2\pi)$
Graph the function. Show at least one period, labeling key points.
44. $y = 2\sin(2x - \frac{\pi}{3})$
45. $y = 3\cos\left(3x + \frac{\pi}{2}\right)$
46. Find the exact value of the expression.
a. $\tan\left[\cos^{-1}\left(-\frac{1}{2}\right)\right]$
b. $\sin\left[\cos^{-1}\left(\frac{4}{7}\right)\right]$
c. $\sin^{-1}[\sin\left(\frac{5\pi}{4}\right)]$
Solve the equation on the interval 0 ≤ θ < 2π.
47. $2\cos\theta + 1 = 0$
48. $4\sin^2\theta - 3 = 0$
49. $2\cos^2\theta - 3\cos\theta + 1 = 0$
50. $2\sin^2\theta = 3(\cos\theta + 1)$

51-53. no problems….

Use the information given about the angle θ, 0 ≤ θ ≤ 2π, to find the exact value of the indicated trigonometric function.
Simplify the expression.
54. $\frac{\cos\theta}{1+\sin\theta} + \tan\theta$

Establish the identity.

55. $tan\, u(csc\, u\ -\ sin\, u)\ =\ cos\, u$

56. $(sin\, x)(tan\, x\, cos\, x\ -\ cot\, x\, cos\, x)\ =\ 1\ -\ 2\, cos^2\, x$

57. $1\ -\ \frac{cos^2 u}{1-\sin u} = -\, sin\, u$

An object attached to a coiled spring is pulled down a distance a from its rest position and then released. Assuming that the motion is simple harmonic with period T, write an equation that relates the displacement d of the object from its rest position after t seconds. Also assume that the positive direction of the motion is up.

58. a = 6; T = 3 seconds

At time t = 0, an object attached to a coiled spring is at its resting position and moving down. Assuming that the motion is simple harmonic with period T, write an equation that relates the displacement d of the object from its rest position after t seconds. Also assume that the positive direction of the motion is up.

59. a = 10; T = 4 seconds

The displacement d (in meters) of an object at time t (in seconds) is given. Describe the motion of the object. What is the maximum displacement from its resting position, the time required for one oscillation, and the frequency?

60. d = 4 sin (5t)

61. d = 4 cos (3t)

- Know basic factoring.
- Division of polynomials, both synthetic division and long division.