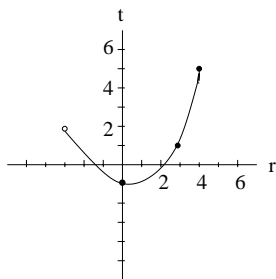


Review for EXAM # 1

MATH 142

Drost-Fall 2006



- What is the independent variable?
 - What is the domain?
 - What is the range?
 - What is $f(3)$?

ans: r , $(-3, 4]$, $[-1, 5]$, 1
- Find the domain of $f(x) = \frac{\sqrt{9-3x}}{x^2-5}$ and write your answer in inequality notation.
ans: $\mathcal{R}, x \leq 3, x \neq \pm\sqrt{5}$
- Find the domain of $g(x) = \frac{2x^2+x-3}{3x^2-x-2}$ and write your answer in interval form.
ans: Domain: $\mathcal{R}, (-\infty, -\frac{2}{3}) \cup (-\frac{2}{3}, 1) \cup (1, \infty)$
- Find the average rate of change between the points $(8, -2)$ and $(-5, 4)$.
ans: $-\frac{6}{13}$
- Determine the x- and y-intercepts for the graph of $f(x) = \frac{75-10x}{5-x}$.
ans: $(0, 15), (7.5, 0)$
- Given $f(x) = 2x - 3x^2$, use the difference quotient to determine the slope of the secant line where $x = -2$ and $\Delta x = 3$.
ans: 5
- Given $f(x) = \sqrt{x}$, $g(x) = x + 4$. Find $(f \circ g)(x)$ and its domain.
ans: $\sqrt{x+4}$, $[-4, \infty)$
- Given $f(x) = \frac{x^2}{2x+5}$
 - Find the intercepts (0, 0)
 - Find any horizontal asymptotes. none
 - Find any vertical asymptotes. $x = -2.5$
 - Graph
- Rewrite the radical function $f(x) = \sqrt[4]{(x^2-4)^3}$ in exponential form and state the domain.
ans: $f(x) = (x^2-4)^{\frac{3}{4}}$, $\mathcal{R}, x \geq 2, x \leq -2$

- Classify the functions below as exponential growth or decay:

$f(x) = (\frac{2}{5})^x$ ans: decay

$g(x) = (\frac{3}{2})^{-x}$ ans: decay

$h(x) = e^{0.7x}$ ans: growth

- Kyle deposits \$2400 into an account that pays interest at a rate of 6.25% compounded weekly.
 - How long before the account reaches \$4,000?
 - How much is in the account after 3 years?
ans: a) 8.18 yrs, b) \$2,894.63
- J.J. deposits \$1500 into an account paying $6\frac{3}{4}\%$ compounded continuously.
 - How long before the balance is \$2500?
 - What is the balance after 2 years?
ans: a) 7.6 yrs., b) \$1,716.81
- Given $f(x) = 2.5e^{0.02x}$ where x is the time in minutes and $f(x)$ is the number of bacteria in the culture in thousands. Find the number of bacteria in the culture after 2 hrs, rounded to the nearest hundred.
ans: 27,600 bacteria
- Rewrite in logarithmic form:
 - $10^x = 2.4$ ans: $\log 2.4 = x$
 - $5^{x+1} = 3$ ans: $\log_5 3 = x + 1$
 - $e^{x^2} = 14$ ans: $\ln 14 = x^2$
- Given $\log_b 2 = -3$, and $\log_b 5 = 4$, evaluate $\log_b 20b^3$
ans: 1
- Given $f(x) = \frac{2100}{1+20e^{-.2x}}$
 - What is the initial population?
 - What is the upper limiting population?
ans: a. 100, b. 2100
- Given the following data for the average cost of a new home in thousands of dollars, let x represent the year 1960.

Year	1965	1968	1975	1980	1985	1990	1995
Cost	21.5	26.6	40.1	75.5	110.2	145.6	176.2

 - Find the best fitting model, using quadratic, cubic or logistic, and explain why you think this is the best model.
 - Using this model, predict the average cost in 2003.
ans: a. logistic, best fit of the data, and eventually levels off.
Quad rises too fast, Cubic actually becomes neg.
ans: b. \$213,880

18. An item sells for \$9. If the fixed costs are \$600 and the total costs are \$2000 when 200 items are made and sold, find the cost equation.

ans: $C = 7x + 600$

19. Find the profit when 400 items are made and sold. (See #18)

ans: 200

20. Find the best fitting curve between exponential and cubic regression for the following table of data, where x = number of years since 1980, and y = number of cases of meningitis in Houston.

Year	'82	'85	'88	'90	'97
Popul	8	12	25	30	56

ans: cubic has the highest r^2 value and decreases as time increases, which is likely if a cure is found.

21. $y^2 + 3x = 5$, does this equation describe a function?

ans: no, when you solve for y , you get two solutions, $y = \pm$ therefore it fails a vertical line test.

22. Find the difference quotient for:

$$f(x) = x^2 + 5x - 10$$

ans: $2x + h + 5$

23. Solve $\log_7(\log(\ln x)) = 1$

ans: $x = e^{10^7}$

24. Given $\log x = 8$ and $\log y = 12$, evaluate: $\log x^2y$

ans: 28

25. Solve: $5 \cdot 3^{2x-1} = 2$

ans: $x = \frac{1}{2} \left(1 + \frac{\log .4}{\log 3} \right)$

26. Solve: $\log_8(x - 3) = 2$

ans: $x = 67$

27. Solve: $\log_2 x + \log_2(x - 7) = 3$

ans: $x = 8$

28. If planted with 100 trees, each tree produces \$50 per year. Due to overcrowding, for each additional tree planted the yield drops 50 cents. How many trees should be planted to maximize the revenue?

ans: 100 trees

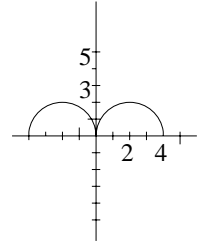
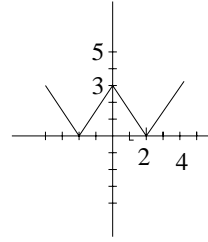
If the cost to care for the trees (fertilizer and water) run \$15 per year per tree, how many trees should be planted to maximize profit?

ans: 85 trees

29. Find the domain of $f(x) = \frac{2x^2 + 7x - 15}{x + 5}$

ans: $\mathcal{R}, x \neq -5$

30. Given the graphs of $f(x)$ and $g(x)$ below, show the graph of $f(x - 3) + 2$ and $-g(x + 1) - 5$



31. Which of the following are polynomials?

a) $f(x) = 3x^2 - \frac{5}{x} + 6$

b) $g(x) = 3\sqrt{x} + 2$

c) $h(x) = e^x$

d) $F(x) = 5x^3 - \frac{3}{x-4}$

ans: d

32. Given the logistic model: $y = \frac{28}{1 + 6e^{-.001x}}$.

a) what is the limiting value?

ans: 28

b) what is the initial value?

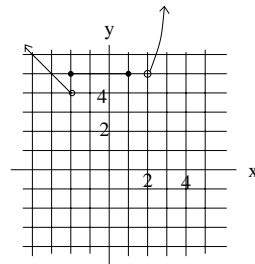
ans: 4

33. How long does it take for an account earning $10\frac{3}{4}\%$ compounded quarterly to double?

ans: 6.53 years

34. Graph the piecewise defined function

$$f(x) = \begin{cases} |x - 2|, & \text{if } x < -2 \\ 5, & \text{if } -2 \leq x \leq 1 \\ x^2 + 1 & \text{if } x > 1 \end{cases}$$



35. A machine purchased for \$1800 has a useful life of 6 years and a scrap value of \$500. Assuming a straight line depreciation, find its value at 4 years old.

ans: \$933.33

36. Solve: $25^{3x} = 125^{x-4}$

ans: $x = -4$