

Math 142 In Class Exam 1 Review

1. A baby weighed 8 pounds at birth. His weight increased linearly so that he gained 2 pounds per month for the first 4 months. then he gained more slowly so that he weighed 24 pounds at 12 months of age. Write the piecewise definition of his weight as a function of t = his age in months.

2. A company making a single product has fixed costs totaling \$120 per day. Each unit costs an additional \$21 to produce. Demand quantity is 12 per day if the selling price is \$58 and demand increases by 3 for each \$1 decrease in the price. Find the cost, revenue and profit functions and find the break even quantities.

3. If \$P is invested at 6.4%, how long will it take to double the value in the account if interest is compounded continuously?

4. \$P is invested at annual interest rate, r , compounded continuously. The amount after 2 years is \$1525.63 and the amount after 3 years is 1575.04. Find P and r .

5. A population grows at continuous annual rate 2%. If initially there were 500000 people, how many are there at 2 years?

6. a) Solve for x . $\log_4(x + 3) + \log_4(x - 3) = 2$

b) Write as a single logarithm. $4 \log x + \frac{1}{2} \log(x^2 + 1) - 3 \log(x + 2)$

7. $g(x) = \frac{3x^2 + 3x - 18}{2x^2 - 2x - 4}$

Evaluate each limit as a number, infinity or minus infinity.

a) $\lim_{x \rightarrow -3} g(x)$ b) $\lim_{x \rightarrow -1^-} g(x)$ c) $\lim_{x \rightarrow -1^+} g(x)$ d) $\lim_{x \rightarrow 2} g(x)$

e) $\lim_{x \rightarrow \infty} g(x)$

$$8. f(x) = \begin{cases} \frac{x^2 - x - 20}{x^2 + 8x + 16} & x < 5 \\ \ln(x - 4) & 5 \leq x \end{cases}$$

List all discontinuities of $f(x)$ and for each a) describe graphically and b) tell what fails in the definition of continuity.

9. Evaluate each limit as infinity, minus infinity or a number.

$$a) \lim_{x \rightarrow \infty} \frac{2e^x + 7}{3e^x - 9} \quad b) \lim_{x \rightarrow -\infty} \frac{2e^x + 7}{3e^x - 9}$$

$$c) \lim_{x \rightarrow -\infty} \frac{3x^4 + 2}{4x} \quad d) \lim_{x \rightarrow \infty} \frac{2x^3 + 3x}{4x^4 - 90}$$

10. Find all values of x at which f is not differentiable and describe each as a vertical tangent, corner or discontinuity.

$$f(x) = \begin{cases} x^{2/3} & x < 1 \\ x^2 - 6x + 6 & 1 \leq x < 4 \\ 16x^{1/2} - 2x - 26 & 4 \leq x \end{cases}$$

11. The tangent line to $f(x)$ at $x=3$ is $y = -2x + 1$. Find $f(3)$ and $f'(3)$.

12. Find the tangent line at the given x-value.

a) $f(x) = 6x^{1/3} - 2x + 1$ at $x = 8$

b) $g(x) = \frac{(x-4)^2}{\sqrt{x}} + 1$ at $x = 4$