

Final Review 18 questions Mult-Choice (4)

① Fixed cost \$750, variable cost \$40

write total cost function

$$C(x) = 750 + 40x$$

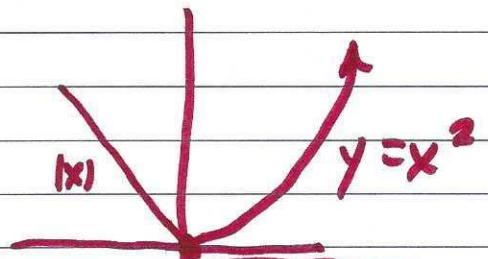
② Find $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2} = \lim_{x \rightarrow 2} \frac{(x+2)(x-2)}{(x-2)}$

①

③ $f(x) = \begin{cases} |x| & \text{if } x < 0 \\ x^2 & \text{if } x \geq 0 \end{cases}$

Is it discontinuous

IS CONTINUOUS



④ Given $f(x) = \frac{x+1}{x^2+3}$

What is $f'(x)$? $\frac{(x^2+3)(1) - (2x)(x+1)}{(x^2+3)^2}$

②

⑤ Find equation of line tangent to
 $y = x^2$ @ $x = 2$

$$\frac{dy}{dx} = 2x \text{ and @ } x = 2 \text{ deriv. is } \underline{4}$$

this is slope of line.

$$y = mx + b \rightsquigarrow y = 4x + b$$

You are @ point (2, 4)

$$4 = 4 \cdot 2 + b \Rightarrow 4 = 8 + b \text{ so } b = -4$$

$$\text{then } \underline{y = 4x - 4}$$

$$\frac{2}{3} \quad \frac{2}{3} \cdot \frac{2}{3} \quad \frac{2}{3} \cdot \frac{2}{3} \cdot \frac{2}{3}$$

⑥ Chain Rule

Want deriv of $f(x) = (x^2 + 4)^{2/3}$

$$f'(x) = \frac{2}{3} (x^2 + 4)^{-1/3} \cdot (2x)$$

③

⑦ $x^2 - 3x + 4$

$2x - 3 = f'(x)$

$2x - 3 = 0 \Rightarrow x = 3/2$

What is

$f'(x) = \frac{x}{(x-2)(x-1)}$

Crit #s : 0, 2, 1

⑧ Suppose cost function is

$C(x) = x^2 - 10x + 21$

Where is cost increasing?

$C'(x) = 2x - 10$ for $x \geq 5$ $C'(x) > 0$

⑨ Does $f(x) = x^3 + 1$ have an inflexion point

$f'(x) = 3x^2$

$f''(x) = 6x$ yes... @ zero!

⑩ Implicit Differentiation

$x^2y + 3y = 5$ What is $\frac{dy}{dx}$

(4)

y is fun of x , so

$$\underline{2xy} + x^2 \frac{dy}{dx} + 3 \frac{dy}{dx} = 0$$

$$\frac{dy}{dx} [x^2 + 3] = -2xy$$

$$\frac{dy}{dx} = \frac{-2xy}{x^2 + 3}$$

(11) $\int e^{5t} dt = \frac{e^{5t}}{5} + C$ $\int e^{kx} dx = \frac{e^{kx}}{k}$

(12) Rate of using electricity in a factory

If $E(t)$ is amount of elec

$E'(t)$ is rate of using

Suppose $E'(t) = 30 - 3t$ t in hours
 $0 \leq t \leq 8$

⑤

$E(t)$ is integral $\int (30 - 3t) dt =$

$$E(t) = 30t - \frac{3t^2}{2} + C \quad \downarrow \quad 0$$

⑬ $\int 2x e^{x^2} dx$ $\rightarrow e^u$

Let $u = x^2$ $\underline{du = 2x dx}$ | ~~dx~~

$$\int e^u du = \underline{e^u + C} \rightarrow \boxed{e^{x^2} + C}$$

⑭ $\int \frac{t^2 + 1}{t^3 + 3t + 6} dt$

\downarrow

$$u = t^3 + 3t + 6$$

$$du = (3t^2 + 3) dt$$

$$\int \frac{1}{u} \frac{du}{3} = 3 \int \frac{du}{u} \rightarrow = 3 \underline{(t^2 + 1) dt}$$

$$\int_1^5 e^x dx = [e^x]_1^5 = e^5 - e^1 = \underline{\underline{e^5 - e}}$$