Exam

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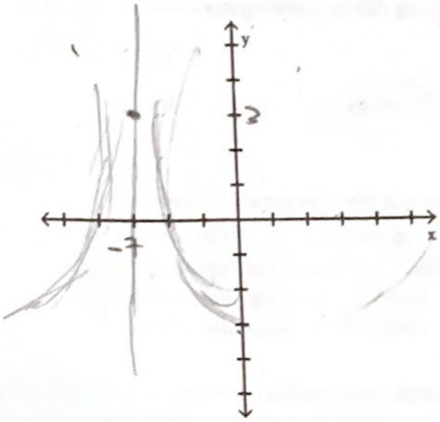
SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Draw a graph to match the description. Answers will vary.

1) F(x) has a positive derivative over $(-\infty, -7)$ and $(-7, 3)$ and a negative derivative over $(3, \infty)$, and a derivative equal to 0 at $x = -7$. 1) ______

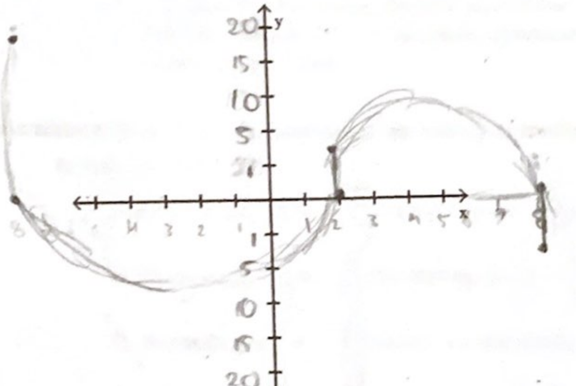


2) $\boxed{f'(-8) = 0,\ f''(-8) < 0,\ f(-8) = 18,}$ $f'(8) = 0$, $f''(8) > 0$, $f(8) = -2$, $f''(2) = 0$ and $f(2) = 3$. 2) ______

$f(-8)=18$ $f'(-8)=0$

$f(8)=-2$ $f'(8)=0$

$f(2)=3$



$f''(-8)<0$

$f''(8)>0$

$f''(2)=0$

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

3) The function $R(x) = 8000 - x^3 + 27x^2 + 400x$, $0 \le x \le 20$, represents revenue in thousands of dollars where x represents the amount spent on advertising in tens of thousands of dollars. Find the inflection point for the function to determine the point of diminishing returns. 3) A

A) (9, 13,058) B) (41.64, -728.14) C) (14, 16,148) D) (10.8, 14,209.57)

Find the limit, if it exists.

4) $\lim\limits_{x \to -\infty} \frac{4x^3 + 4x^2}{x - 7x^2}$ 4) A

A) $-\infty$ B) 4 C) $-\frac{4}{7}$ D) ∞

Determine the vertical asymptote(s) of the given function. If none exists, state that fact.

5) $f(x) = \frac{8x}{x - 4}$ 5) B

A) $x = -4$ B) $x = 4$ C) none D) $x = 8$

Solve the problem.

6) A firm estimates that it will sell N units of a product after spending x dollars on advertising, where $N(x) = -x^2 + 150x + 11,\ 0 \le x \le 150,$ and x is in thousands of dollars. Find the relative extrema of the function. 6) A

A) relative maximum at (75, 5636) B) relative minimum at (75, 16,886)
C) relative minimum at (75, 5636) D) relative maximum at (75, 16,886)

Find the absolute maximum and absolute minimum values of the function, if they exist, over the indicated interval. When no interval is specified, use the real line $(-\infty, \infty)$.

7) $f(x) = 2x^2 - 24x + 75$ 7) B

A) Absolute maximum: 3; no absolute minimum
B) No absolute maximum; absolute minimum: 3;
C) Absolute maximum: 291; absolute minimum: 3
D) No absolute extrema

Determine where the given function is increasing and where it is decreasing.

8) $f(x) = x^2 + 7x - 4$ 8) A

A) Decreasing on $\left(-\infty, -\frac{7}{2}\right]$, increasing on $\left[-\frac{7}{2}, \infty\right)$

B) Decreasing on $\left(-\infty, \frac{7}{2}\right]$, increasing on $\left[\frac{7}{2}, \infty\right)$

C) Increasing on $\left(-\infty, -\frac{7}{2}\right]$ and $(0, \infty)$, decreasing on $\left[-\frac{7}{2}, 0\right]$

D) Increasing on $\left(-\infty, -\frac{7}{2}\right]$, decreasing on $\left[-\frac{7}{2}, \infty\right)$

Solve the problem.

9) A company wishes to manufacture a box with a volume of 20 cubic feet that is open on top and is twice as long as it is wide. Find the width of the box that can be produced using the minimum amount of material. Round to the nearest tenth, if necessary. 9) A

A) 2.4 ft B) 3.1 ft C) 4.8 ft D) 6.2 ft

10) A company knows that unit cost C(x) and unit revenue R(x) from the production and sale of x units are related by $C(x) = \frac{[R(x)]^2}{128{,}000} + 11{,}439$. Find the rate of change of revenue per unit when the cost per unit is changing by \$15 and the revenue is \$2000. 10) B

A) \$811.95/unit B) \$480/unit C) \$150/unit D) \$1143.9/unit

11) The average cost for a company to produce x thousand units of a product is given by the function 11) A

$A(x) = \frac{1024 + 600x}{x}$

Use $A'(x)$ to estimate the change in average cost if production is increased by one thousand units from the current level of 16 thousand.

A) Average cost will increase by $4
B) Average cost will increase by $64
C) Average cost will decrease by $4
D) Average cost will decrease by $64

For the given demand equation, differentiate implicitly to find dp/dx.

12) $(p + 2)(x + 4) = 23$ 12) C

A) $\frac{dp}{dx} = -\frac{2}{x+4}$
B) $\frac{dp}{dx} = -\frac{p+2}{5}$
C) $\frac{dp}{dx} = -\frac{x+4}{p+2}$
D) $\frac{dp}{dx} = -\frac{p+2}{x+4}$

$$px + 4p + 2x + 8 = 23$$

$$\frac{dy}{dx} px + \frac{dy}{dx} 4p + \frac{dy}{dx} 2x = 0$$

$$1x \frac{dy}{dx} p \cdot 1 + \frac{d4}{dx} + \frac{dy}{dx} 2 = 0$$

$$\frac{1p + 2}{1p + 2} = \frac{1x + 4}{p + 2}$$

$R(x)=800-x^3+27x^2+400x$ $0 \leq x \leq 20$

$R(x)=-3x^2+54x+400$ $800-(9)^3+27(9)^2+400(9)$

$R(x)=-6x+54=0$

$\frac{-6x}{-6}=\frac{-54}{-6}$

$\boxed{x=9}$

$V(x)=-x^2+150x+11$

$=-2x+150=0$

$\frac{-2x}{-2}=\frac{-150}{-2}$

$x=75$

20

$\frac{2x^2y}{2}=\frac{20}{2}=\frac{10}{x^2}=y$

$2x^2y=20$

$S6xy+2x^2$

$S=6x\left(\frac{10}{x^2}\right)+2x^2$

$S=2x^2+2xy+4xy$

$S=2x^2+6xy$

$\frac{60}{x}+2x^2$

$S=60x^{-1}+2x^2$

$S'=-60x^{-2}+4x=0$

$\frac{-60}{x^2}+4x=0$

$\frac{4x}{1} = \frac{60}{x^2}$

$\frac{4x^3}{4}=\frac{60}{4}$

x^3 $\sqrt{15}$

Norma Esta hoja de papel, está hecha de caña. Papel de caña de azúcar