# Final Exam Review

Wednesday, December 4, 2019 12:43 PM

## MC Section

(1) $f(x) = x^2 - 3x - 3$. Find $f(-3)$.

Plug $-3$ into $x$ and simplify:

$$f(-3) = (-3)^2 - 3\cdot(-3) - 3$$

$$= 9 + 9 - 3$$

$$= 18 - 3 = \boxed{15}$$

D

(2) To find domain: Look at x-axis from left to right.

Domain $= [-3, 0]$

closed dot: included (open dot: excluded)

[ ] ( )

To find range: Look at y-axis from lowest point to highest point

Range $= [-1, 3]$

Answer: D

(3)

| Parent Function | Transformed function | Transformation |
| --- | --- | --- |
| $y = f(x)$ | $y = f(x+c)$ | Left, c units |
| | $y = f(x-c)$ | Right, c units |
| | $y = f(x) + c$ | Up, c units |
| | $y = f(x) - c$ | Down, c units |
| | $y = c \cdot f(x)$; $c > 1$ | Stretch vertically |
| | $y = c \cdot f(x)$; $c < 1$ | Shrink vertically |
| | $y = -f(x)$ | Flip across x-axis |

$y = \sqrt{x}$ ; $y = -\sqrt{x+3}$

(Parent) Left 3 units, flip across x-axis

Answer: C.

(4)

Find domain of $f(x) = \dfrac{p(x)}{q(x)}$

Step 1: Set denominator $q(x) = 0$ and solve for $x$

Step 2: Domain = all real excluding solutions in Step 1

In this problem $f(x) = \dfrac{x-1}{x^3 - 16x}$

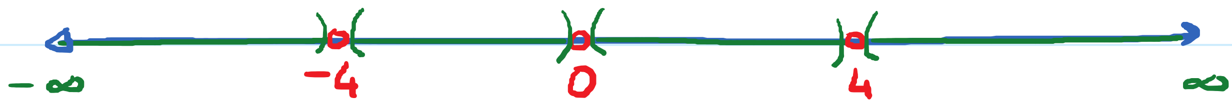
Step 1: Set $x^3 - 16x = 0$ and solve:

$x(x^2 - 16) = 0$ (Factor)

$\boxed{x = 0}$ ; $\underbrace{x^2 - 16 = 0}$ (Set each factor equal to 0)

$x^2 = 16 \rightarrow x = \pm\sqrt{16} = \boxed{\pm 4}$

Step 2: Exclude the x-values in Step 1 from number line




Domain $= \boxed{(-\infty,-4) \cup (-4,0) \cup (0,4) \cup (4,\infty)}$

C.

5. Vertex Formula:

$$\boxed{\begin{aligned} x_{vertex} &= -\frac{b}{2a} \\ y_{vertex} &= f(x_{vertex}) \end{aligned}}$$

$f(x) = -2x^2 + 12x - 17$ ; $a = -2$ ; $b = 12$

$$x_{vertex} = -\frac{12}{2(-2)} = 3$$

$$\begin{aligned} y_{vertex} = f(3) &= -2(3)^2 + 12(3) - 17 \\ &= -2 \cdot 9 + 36 - 17 \\ &= -18 + 36 - 17 \\ &= 1 \end{aligned}$$

Vertex : $\boxed{(3, 1)}$ D.

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6. Leading term test :

Leading term $= \boxed{a}\,x^{\boxed{n}}$ degree

Leading coefficient

| | n even | n odd |
|---|---|---|
| $a>0$ | $\nwarrow$ $\nearrow$ | $\swarrow$ $\nearrow$ |
| $a<0$ | $\swarrow$ $\searrow$ | $\nwarrow$ $\searrow$ |

Here, leading term $= \boxed{-0.7}\,x^{\boxed{6}}$ → even

negative.

End Behavior: ↙ ↘ Choice C.

(7) $\log_{\boxed{b}} \boxed{8} = \boxed{3} \longrightarrow \boxed{b^3 = 8}$

quantity exponent

base

(Logarithmic form) (Exponential Form)

Choice A

(8) $\boxed{14}^{\boxed{2}} = \boxed{y} \longrightarrow \boxed{\log_{14} y = 2}$ A

exponent quantity

base

(Exponential form) (Logarithmic Form)

(9) $\ln x + \boxed{9}\ln y = \ln x + \ln y^9 = \boxed{\ln(x \cdot y^9)}$

Power Rule Product Rule

Choice B

10 Given $\log_a 11 = 2.398$ ; $\log_a 5 = 1.609$

Find $\log_a \frac{11}{5}$

$$\log_a \frac{11}{5} = \log_a 11 - \log_a 5$$

quotient rule

$$= 2.398 - 1.609 = \boxed{0.789}$$ A

11 $e^{3x} = 5$

$\ln(e^{3x}) = \ln 5$ (Take ln of both sides)

$3x = \ln 5$ (Property: $\boxed{\ln e^{M} = M}$ )

$$\boxed{x = \frac{\ln 5}{3}}$$ B

(12) Solve $6 + 6\ln x = 10$

Isolate the logarithm:

$6\ln x = 4$ (Subtract 6)

$\ln x = \frac{4}{6}$ (Divide by 6)

$\ln x = \frac{2}{3}$ (Simplify)

$\log_{\boxed{e}} x = \boxed{\frac{2}{3}}$ (ln is log base e)

base exponent

$\boxed{x = e^{\frac{2}{3}}}$ (e raised to the $\frac{2}{3}$)

Choice B