ICM Final Exam Practice #2

Key

Write the domain each function in interval notation.

7. $y = \dfrac{x^2 - 16}{x - 4}$ $x \neq 4$ $(-\infty, 4) \cup (4, \infty)$

8. $y = \sqrt{x - 3}$ $x \geq 3$ $[3, \infty)$

9. $y = \dfrac{1}{\sqrt{25 - x^2}}$ $(-5, 5)$

Write the range of each function in interval notation.

10. $y = -x^2 + 1$ $(-\infty, 1]$

11. $y = 4^x$ $(0, \infty)$

Evaluate each for f(x) = 3x² + 2x – 1.

12. $f(-4)$ $3(-4)^2 + 2(-4) - 1 = 39$

13. $f(2x)$ $3(2x)^2 + 2(2x) - 1 = 12x^2 + 4x - 1$

14. $\dfrac{f(x+h) - f(x)}{h}$ $\dfrac{3(x+h)^2 + 2(x+h) - 1 - (3x^2 + 2x - 1)}{h} = \dfrac{3x^2 + 6xh + 3h^2 + 2x + 2h - 1 - 3x^2 - 2x + 1}{h}$

$\dfrac{6xh + 3h^2 + 2h}{h}$

$6x + 3h + 2$

Change each radian measure to degree measure.

15. $\dfrac{\pi}{8}$ $22.5°$

16. $-\dfrac{7\pi}{12}$ $-105°$

Change each degree measure to radian measure in terms of π.

17. 130° $\dfrac{13\pi}{18}$

18. -300° $-\dfrac{5\pi}{3}$

Find the reference angle for each angle with the given measure.

19. $\dfrac{9\pi}{4}$ $45°$

20. 585° $45°$

21. $-\dfrac{7\pi}{3}$ $60°$

Find each exact value without looking at unit circle (you can sketch your own).

22. $\sin\dfrac{3\pi}{4}$ $\dfrac{\sqrt{2}}{2}$

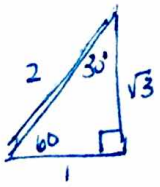
23. $\cos\dfrac{7\pi}{3}$ $\dfrac{1}{2}$

24. tan 120° $-\sqrt{3}$

25. csc 315° $-\sqrt{2}$

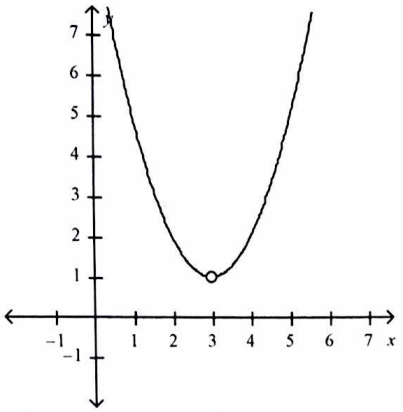
26. $\sec\dfrac{18\pi}{4}$ $\sec 90$ undefined

27. $\cot -\dfrac{5\pi}{6}$ $\cot 210 = \cot 30 = \sqrt{3}$



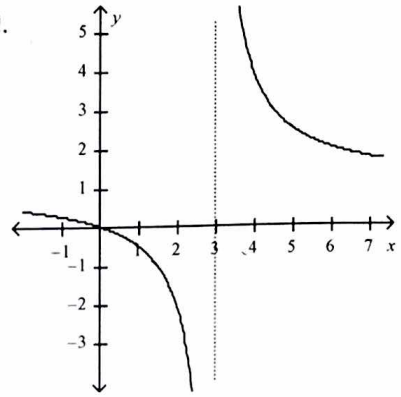
Use the graph to determine a) $\lim_{x\to 3^-} f(x)$ **b)** $\lim_{x\to 3^+} f(x)$ **c)** $\lim_{x\to 3} f(x)$

28.



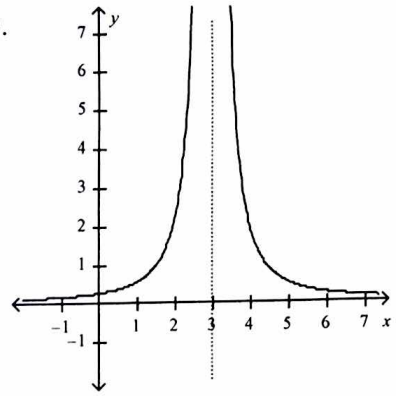
a) 1 b) 1 c) 1

29.



a) $-\infty$ b) ∞ c) DNE

30.



a) ∞ b) ∞ c) ∞

Find the indicated limit. Write "DNE" if the limit does not exist. If the limit approaches infinity or negative infinity, indicate that as well.

31. $\lim_{x\to -2}(3x^2+4x-2)$ $= 3(-2)^2+4(-2)-2$ $= 2$

32. $\lim_{x\to 0}\frac{x+2}{x^2-x-6}$ $= \frac{2}{-6} = -\frac{1}{3}$

33. $\lim_{x\to 1^-}\frac{8}{x-1}$ $-\infty$

34. $\lim_{x\to 0}\frac{x}{x^2+2x+3}$ $= \frac{0}{3} = 0$

35. $\lim_{x\to -2}\frac{x^2-4}{x^3+8}$ $= \frac{(x-2)(x+2)}{(x+2)(x^2-2x+4)} = \frac{-4}{12} = -\frac{1}{3}$

36. $\lim_{x\to -3}\frac{x^2-2x-15}{x^2+7x+12}$ $= \frac{(x-5)(x+3)}{(x+3)(x+4)} = \frac{-8}{1} = -8$

Determine the values of x, if any, at which each function is discontinuous. Write "continuous" if the functions contains no discontinuities. For each point where the function is discontinuous, tell whether it is a vertical asymptote or a removal discontinuity.

37. $f(x)=\frac{9}{2x-1}$

$2x-1\neq 1$

$x=\frac{1}{2}$ VA

38. $f(x)=\frac{2}{\sqrt{x^2+6}}$

Continuous

39. $f(x)=\frac{x+5}{x^2+7x+10}$

$(x+5)(x+2)$

$x=-5$ hole

$x=-2$ VA