OAK HALL SCHOOL

2024-2025

Suggested Review Exercises
for students entering

Honors
Calculus

Mathematics is a subject that is cumulative in nature as it constructs new knowledge from foundational prior knowledge. Therefore, as it is imperative to our students' success, we require them to have mastered certain skills and concepts before entering a new math course.

Each course in the math department has provided suggested exercises for incoming students as a resource for them to review the required prerequisites that are critical to their success in the course. While we will not be requiring students to complete these exercises as a formal assignment to be turned in, we have the highest expectations of our students as self-aware, proactive learners. Each student is responsible for gauging which prerequisites they need to reinforce and how much studying they need to do for them to start the new school year feeling confident, prepared, and accomplished.

We recommend that our students begin this process mid to late summer in order for everything to be fresh in their minds but also to give them time to recover from the school year they just completed. Rest is not an indulgence; it is a human necessity. We hope everyone has a safe, fun, and restful summer and we look forward to having another great school year when we come back in August!

Summer Study Guide

Name_____

Entering Calculus

Solve each equation.

1) $5v - 10 = -7(4v - 11) - 11(-9 - 3v)$

2) $-6(4p - 12) + 4(7p - 12) = 4p - 12 + 1 - 7p$

Evaluate each function.

3) $f(n) = 4n - 4$; Find $f(-7)$

4) $k(x) = 3x^2 - 4$; Find $k(5)$

5) $f(x) = x^3 + x^2$; Find $f(-3x)$

6) $g(n) = n - 5$; Find $g(n + 2)$

Perform the indicated operation.

7) $f(t) = 2t + 4$
$g(t) = -3t^3 + 4$
Find $(f \circ g)(t)$

8) $g(x) = x^2 - 4x$
$f(x) = 3x + 4$
Find $(g \circ f)(x)$

Factor each completely.

9) $4x^3 + 32x^2 - 3x - 24$

10) $3x^3 + 36x^2 + 108x$

Solve each equation by factoring.

11) $4k^2 = -40 - 28k$

12) $4b^2 + 32b = -48$

13) $m^2 + 4m = 12$

Factor each completely.

14) $7k^2 + 3k$

15) $7a^2 - 24a + 20$

16) $35x^2 + 305x - 90$

17) $6r^3 + 7r^2 - 24r$

18) $25x^2 - 4$

19) $8x^3 + 125$

Divide.

20) $\left(63x^3 - 125x^2 + 5x + 34\right) \div \left(9x - 5\right)$

Simplify each and state the excluded values.

21) $\dfrac{p^2 + 4p - 32}{7p + 56}$

22) $\dfrac{v^2 + 10v + 21}{v^2 - 9}$

23) $\dfrac{v + 7}{5v - 7} \cdot \dfrac{35v^2 - 44v - 7}{7v + 1}$

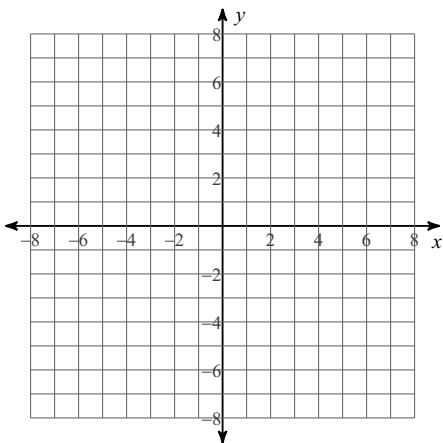24) $\dfrac{3b - 4}{7b} \cdot \dfrac{10b^3 + 80b^2}{3b - 4}$

25) $\dfrac{p - 6}{7 - 35p} \div \dfrac{4}{35p - 7}$

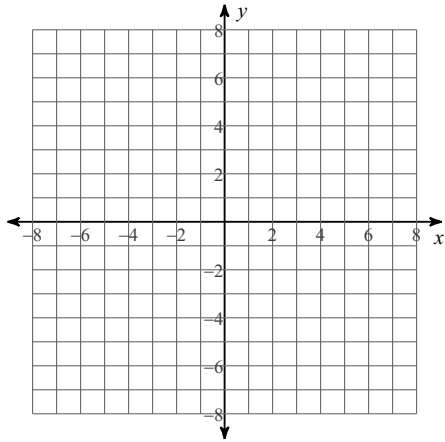**Simplify. Assume that all variables are positive.**

26) $\dfrac{4 + \sqrt{3p}}{10p + \sqrt{5p^3}}$

Identify the points of discontinuity, holes, vertical asymptotes, x-intercepts, horizontal asymptote, and domain of each. Then sketch the graph.

27) $f(x) = \dfrac{1}{x^2 - 4}$

28) $f(x) = \dfrac{x^2 + 3x - 4}{4x + 12}$

Simplify. Your answer should contain only positive exponents.

29) $-vu^4 \cdot \left(-u^{-4}v^{-5}\right)^{-3}$

30) $u^5 v^4 \cdot \left(-u^{-2}v^{-4}\right)^5$

31) $\dfrac{x^{-5}y^0 \cdot -x^{-2}y^{-1}}{\left(x^{-2}y^3\right)^2}$

32) $\left(\dfrac{x^4 y^3 \cdot x^{-2}y^0}{yx^3 \cdot -x^{-1}}\right)^4$

33) $-\dfrac{x^{-3} \cdot x^3 y^{-4}}{\left(x^4 y^{-5}\right)^4}$

Solve each equation.

34) $2^{2-n} = \dfrac{1}{16}$

35) $4^{2n+2} = 2^5$

Evaluate each expression.

36) $\log_7 49$

37) $\log_3 243$

Expand each logarithm.

38) $\log_9 \left(z^4 \sqrt[3]{x}\right)$

39) $\log_6 \left(\dfrac{a^6}{b}\right)^3$

40) $\log_4 \left(ab^3\right)^2$

Condense each expression to a single logarithm.

41) $\log_7 z + \dfrac{\log_7 x}{2} + \dfrac{\log_7 y}{2}$

42) $4\log_9 x - 4\log_9 y$

Solve each equation.

43) $2e^{n-2} = 8$

44) $6^{10n} + 8 = 12$

45) $\log_7 (-5x - 1) = \log_7 (7 - 3x)$

46) $\log_3 6 - \log_3 (x + 6) = \log_3 23$

47) $\log_9 2x^2 - \log_9 2 = 2$

Convert each degree measure into radians and each radian measure into degrees.

48) $240°$

49) 5π

50) $-420°$

51) $-\dfrac{\pi}{3}$

Find the exact value of each trigonometric function.

52) $\sin \dfrac{17\pi}{3}$

53) $\csc \dfrac{7\pi}{3}$

54) $\cos \dfrac{11\pi}{3}$

55) $\sec \dfrac{5\pi}{6}$

56) $\sin \dfrac{\pi}{6}$

57) $\cot -\pi$

58) $\cos -\dfrac{\pi}{4}$

59) $\tan -\dfrac{7\pi}{3}$

Solve each equation for $0 \le \theta < 2\pi$.

60) $3\sqrt{3} + 2\tan\ \theta = 11\tan\ \theta$

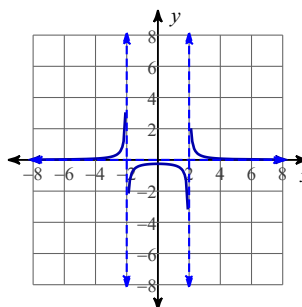61) $-6 + 2\cos\ \theta = -5 + 3\cos\ \theta$

Answers to Entering Calculus

1) No solution.

2) $\{-5\}$

3) -32

4) 71

5) $-27x^3 + 9x^2$

6) $n - 3$

7) $-6t^3 + 12$

8) $9x^2 + 12x$

9) $(4x^2 - 3)(x + 8)$

10) $3x(x + 6)^2$

11) $\{-2, -5\}$

12) $\{-6, -2\}$

13) $\{2, -6\}$

14) $k(7k + 3)$

15) $(7a - 10)(a - 2)$

16) $5(7x - 2)(x + 9)$

17) $r(2r - 3)(3r + 8)$

18) $(5x + 2)(5x - 2)$

19) $(2x + 5)(4x^2 - 10x + 25)$

20) $7x^2 - 10x - 5 + \dfrac{9}{9x - 5}$

21) $\dfrac{p - 4}{7}$; $\{-8\}$

22) $\dfrac{v + 7}{v - 3}$; $\{3, -3\}$

23) $v + 7$; $\left\{\dfrac{7}{5}, -\dfrac{1}{7}\right\}$

24) $\dfrac{10b(b + 8)}{7}$; $\left\{0, \dfrac{4}{3}\right\}$

25) $\dfrac{-p + 6}{4}$; $\left\{\dfrac{1}{5}\right\}$
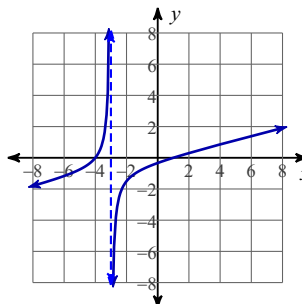
26) $\dfrac{40 - 4\sqrt{5p} + 10\sqrt{3p} - p\sqrt{15}}{100p - 5p^2}$

27)

Discontinuities: 2, –2
Vertical Asym.: $x = 2$, $x = -2$
Holes: None
Horz. Asym.: $y = 0$
X-intercepts: None
Domain:
All reals except 2, –2

28)

Discontinuities: –3
Vertical Asym.: $x = -3$
Holes: None
Horz. Asym.: None
X-intercepts: 1, –4
Domain:
All reals except –3

29) $v^{16}u^{16}$

30) $-\dfrac{1}{u^5v^{16}}$

31) $-\dfrac{1}{x^3y^7}$

32) y^8

33) $-\dfrac{y^{16}}{x^{16}}$

34) $\{6\}$

35) $\left\{\dfrac{1}{4}\right\}$

36) 2

37) 5

38) $4\log_9 z + \dfrac{\log_9 x}{3}$

39) $18\log_6 a - 3\log_6 b$

40) $2\log_4 a + 6\log_4 b$

41) $\log_7\left(z\sqrt{yx}\right)$

42) $\log_9 \dfrac{x^4}{y^4}$

43) $\ln 4 + 2$

44) $\dfrac{\log_6 4}{10}$

45) $\{-4\}$

46) $\left\{-\dfrac{132}{23}\right\}$

47) $\{9, -9\}$

48) $\dfrac{4\pi}{3}$

49) 900°

50) $-\dfrac{7\pi}{3}$

51) -60°

52) $-\dfrac{\sqrt{3}}{2}$

53) $\dfrac{2\sqrt{3}}{3}$

54) $\dfrac{1}{2}$

55) $-\dfrac{2\sqrt{3}}{3}$

56) $\dfrac{1}{2}$

57) Undefined

58) $\dfrac{\sqrt{2}}{2}$

59) $-\sqrt{3}$

60) $\left\{\dfrac{\pi}{6}, \dfrac{7\pi}{6}\right\}$

61) $\{\pi\}$