[5] **1.** Let $f(x)$ and $g(x)$ be given by the graphs below on the right:

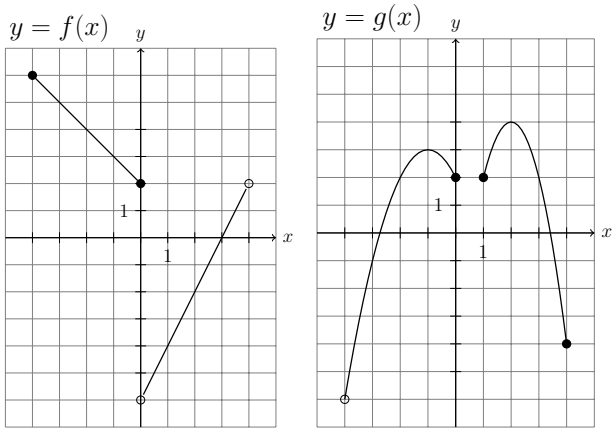
(a) State the domain of f in interval notation.

(b) State the range of g in interval notation.

(c) Evaluate: $(g \circ f)(-1)$

(d) Evaluate: $f^{-1}(2)$

(e) Does g have an inverse function? Why or why not?



[3] **2.** Use long division to calculate $(4x^4 + 10x^3 - 14x - 13) \div (2x^2 - 3)$.
Write your answer in the form $Q(x) + \dfrac{R(x)}{D(x)}$

[3] **3.** Factor completely: $3x^4 - x^3 + 81x - 27$

[4] **4.** Given the function $f(x) = -2x^2 + 6x$,

(a) Find the coordinates of all axis intercepts,

(b) Find the coordinates of the vertex,

(c) Sketch a graph on the given axes and label the points found in the previous parts.

[5] **5.** Given $f(x) = \dfrac{x^2 + 4x + 3}{x^2 + x}$

and $g(x) = \dfrac{x + 3}{x^2 - 2x}$

(a) Simplify: (f/g).

(b) State the domain of (f/g).

6. Given $f(x) = \dfrac{3x + 7}{4 - x}$

[3] (a) Find $f^{-1}(x)$.

[2] (b) Find and simplify $f(2x + 3)$

[4] **7.** Simplify: $\dfrac{\frac{x}{3} - \frac{12}{x}}{6 - x}$

[3] **8.** State the domain of the function in interval notation.
$f(x) = \sqrt{x - 5} + \dfrac{\sqrt{7 - x}}{6 - x}$

9. Solve the following equations for x:

[3] (a) $\dfrac{4x-13}{x^2+2x-3} = -1$

[4] (b) $\sqrt{5x-39}+7 = x$

10. Solve the inequalities: (Express your answer in interval notation.)

[3] (a) $3x^4 + x^3 - 2x^2 < 0$

[3] (b) $x + \dfrac{10}{x-7} \leqslant 0$

[3] **11.** How much money should be invested today at 4% compounded quarterly so that the invesment is worth 10000 in 5 years? (Round your answer to the nearest cent; i.e. two decimal places.)

[4] **12.** Given $f(x) = \log_2(x+4) - 3$

(a) State the equation of any asymptote of the function f.

(b) Find the coordinates of all axis intercepts of f.

(c) Sketch $y = f(x)$ on the axes provided. Clearly display the information you found in the previous parts.

[3] **13.** Given $f(x) = \log_2(x+4) - 3$, find $f^{-1}(x)$.

14. Simplify:

[3] (a) $\dfrac{(4x^5y)^{3/2}}{6x^{-1}y\sqrt{xy^3}}$

[3] (b) $e^{(2\ln x - 3\ln y - \ln z)}$

[2] **15.** Calculate: $\log_3(7) \cdot \log_7(3)$

16. Solve for x:

[3] (a) $x^{-3/2} = 10^6$

[4] (b) $\log x + \log(29 - x) = 2$

[4] (c) $\dfrac{5^x}{3^{x+2}} = 30$. (Two decimal places.)

[5] **17.** The terminal side of an angle θ in standard position contains the point $(-5, -8)$.

(a) Find the exact value of $\tan(\theta)$.

(b) Find the exact value of $\sec(\theta)$.

(c) If θ is in $[0°, 360°)$, calculate θ to two decimal places.

[2] **18.** Convert $12°$ to radians.

[2] **19.** Find the exact value of $\sec(7\pi/6)$.

[2] **20.** Find all θ in $[0, 2\pi)$ such that $\tan(\theta)$ is undefined.

[3] **21.** Find all θ in $[0°, 360°)$ such that $\sin(\theta) = -2/7$. (Two decimal places.)

[3] **22.** Simplify: $\sin x + \cos x \cot x$

[3] **23.** State the amplitude, period, and sketch at least two cycles of the function $f(x) = -3\sin(4x)$.

[3] **24.** A triangle has sides of length a, b and c across from angles of measure A, B, and C respectively. Given that $a = 8$, $B = 60°$ and $c = 3$; find A, b and C. (Round your answers to two decimal places.)

[3] **25.** A wooden board will be used to create a ramp. If the ramp will have an angle of elevation of 15° and a height of 2 metres, how long must the board be? (Answer in metres with two decimal places.)

ANSWERS:

1.(a) $[-4, 4)$

1(b) $(-6, 4]$

1(c) $(g \circ f)(-1) = 2$.

1(d) $f^{-1}(2) = 0$.

1(e) No. It fails the horizontal line test.

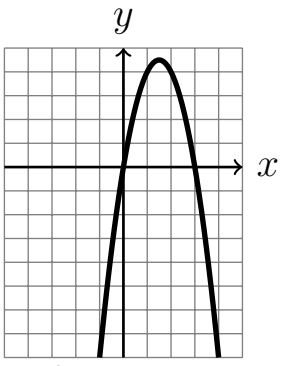
2. $2x^2 + 5x + 3 + \dfrac{x-4}{2x^2-3}$

3(a) $(x+3)(x^2-3x+9)(3x-1)$

4(a) y-int: $(0, 0)$, x-int's: $(0, 0), (3, 0)$

4(b) vertex: $(\frac{3}{2}, \frac{9}{2})$

4(c)



5(a) $x - 2$

5(b) $\mathbb{R}\backslash\{-3, -1, 0, 2\}$

6(a) $f^{-1}(x) = \frac{4x-7}{x+3}$

6(b) $f(2x+3) = \frac{6x+16}{1-2x}$

7. $\dfrac{-(x+6)}{3x}$

8. $[5, 6) \cup (6, 7]$

9(a) $x = -8, x = 2$

9(b) $x = 8, x = 11$

10(a) $(-1, 0) \cup (0, 2/3)$

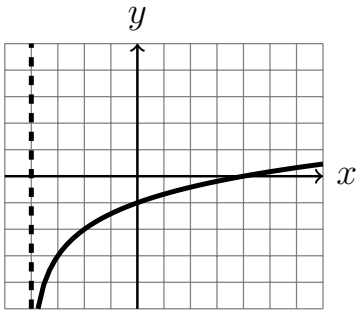
10(b) $(-\infty, 2] \cup [5, 7)$

11. \$8195.44

12(a) V.A. at $x = -4$

12(b) y-int: $(0, -1)$, x-int: $(4, 0)$

12(c)



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

14(a) $\dfrac{4x^8}{3y}$

14(b) $\dfrac{x^2}{y^3 z}$

15. 1

16(a) $\frac{1}{10000}$

16(b) $x = 4, x = 25$.

16(c) $x \approx 10.96$

17(a) $\tan\theta = 8/5$

17(b) $\sec\theta = \frac{-\sqrt{89}}{5}$

17(c) $\theta \approx 237.99°$

18. $12° = \frac{\pi}{15}$

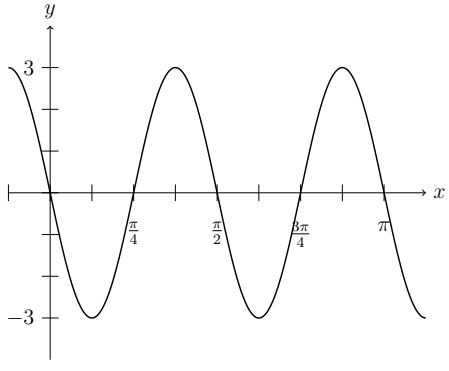
19. $\sec(7\pi/6) = \frac{-2}{\sqrt{3}}$

20. $\theta = \frac{\pi}{2}, \theta = \frac{3\pi}{2}$

21. $\theta \approx 196.60°, \theta \approx 343.40°$

22. $\csc x$

23. $A = 3$, $P = \pi/2$.



24. $b = 7, C \approx 21.79°, B \approx 98.21°$

25. 7.73m.