

CALCULUS MPT ANSWERS TO SAMPLE QUESTIONS

Sample questions are taken from the *Video Tutor* and *Video Tutor Guide*, which is a set of videos and its accompanying workbook that together cover the content of a precalculus course. Each answer given below is followed by a reference to the specific video containing the detailed solution to the question. These videos also provide comprehensive instruction on the underlying concepts as well as related practice problems.

The *Video Tutor* and *Video Tutor Guide* are available in the A/V section of the Capilano University Library (QA 154.2 M858 1992) and in the Mathematics Learning Centre (BR 289).

Algebra

1. $\frac{-x^2}{x^2 - y^2}$ Video 1.6.2

2. $\frac{5}{(x+h+5)(x+5)}$ Video 1.6.3

3. $2x^2y^2\sqrt[3]{2y^2}$ Video 1.7.2

4. $\frac{y-x}{xy}$ Video 1.8.1

5. $\frac{7x+3}{6x^{1/2}(x+1)^{1/3}}$ Video 1.8.2

6. $\frac{3}{\sqrt{2+3(x+h)} - \sqrt{2+3x}}$ Video 1.7.2

7. Volume = $(x+1)(6-2x)(9-2x)$ Video 1.4.4

Equations and Inequalities

8. (a) $x = \frac{ab+bc}{2c^2+ac+c-a^2}$ Video 2.1.3

(b) $x = 0$ or $x = 5$ Video 2.3.1

(c) $x = 1$ or $x = -\frac{1}{2}$ Video 2.4.1

(d) $x = 8$ Video 2.4.1

(e) $x = 2$, $x = -2$, $x = \sqrt{2}$, or $x = -\sqrt{2}$ Video 2.4.2

(f) $x < -\frac{4}{5}$ or $x > 4$ Video 2.6.3

(g) $x = -3$ or $x \geq \frac{3}{2}$ Video 2.7.1

(h) $x < \frac{1}{2}$ or $x \geq 2$ Video 2.7.2

9. $y = -\frac{1}{5}x + \frac{17}{5}$ Video 3.2.3

10. $x = \frac{-55 + 5\sqrt{161}}{2} \approx 4.22$ m. Video 2.3.4

Functions

11. (a) $f(3x) = 5 + \frac{3}{6x+1}$ Video 3.3.2

(b) $3f(x) = 15 + \frac{9}{2x+1}$

(c) $f(x+h) = 5 + \frac{3}{2x+2h+1}$

(d) $\frac{f(x+h) - f(x)}{h} = \frac{-6}{(2x+2h+1)(2x+1)}$

12. $x < -3$ or $x \geq -\frac{1}{2}$ Video 3.3.3

13. Area = $\frac{\sqrt{3}}{4}x^2$ Video 3.3.3

14. (a) $x < 8$ Video 3.3.4

(b) $y > -2$

(c) $f(2) = 1$

(d) $f(0) = \frac{8}{3}$

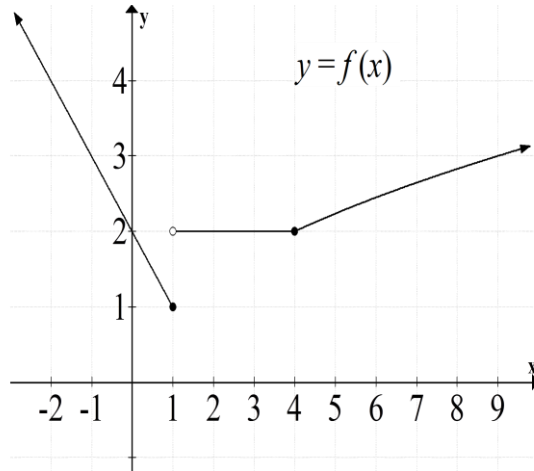
(e) $f(-2) = 1$

15. (a) all real numbers.

Video 3.4.4

(b) $y \geq 1$

(c)



16. (a) $(f \circ g)(x) = \frac{\sqrt{x+2}}{\sqrt{x+2}-3}$

Video 3.6.2

(b) $(g \circ f)(x) = \sqrt{\frac{x}{x-3}} + 2$

(c) Domain of $f \circ g$: $x \geq -2$ and $x \neq 7$

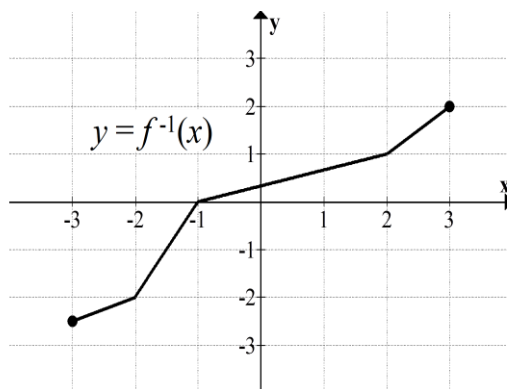
(d) Domain of $g \circ f$: $x > 3$ or $x \leq 2$

17. $f^{-1}(x) = 7 - (x-4)^2$, $x \geq 4$.

Videos 3.7.1 – 3.7.4

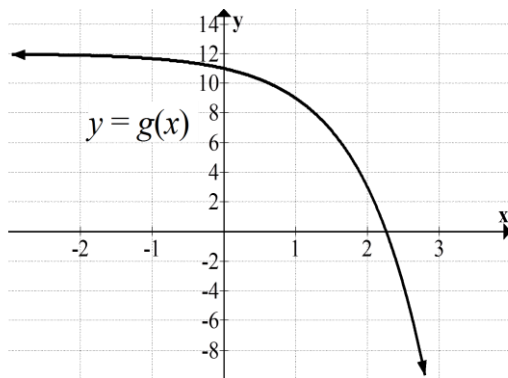
18.

Videos 3.7.1 – 3.7.4



Exponential and Logarithmic Functions

19.



Video 5.1.2

20. $e^{2x} + e^{-2x} + 2$

Video 5.2.1

21. $x = 1 + \sqrt{2}$

Video 5.3.3

22. $x < -3$ or $x > \frac{5}{2}$

Video 5.4.1

23. $f^{-1}(x) = 3 - \ln(x - 2)$

Video 5.4.2

24. $\ln(2) + 3x + 1$

Video 5.4.2

25. $x = 0$ or $x = \ln(3)$

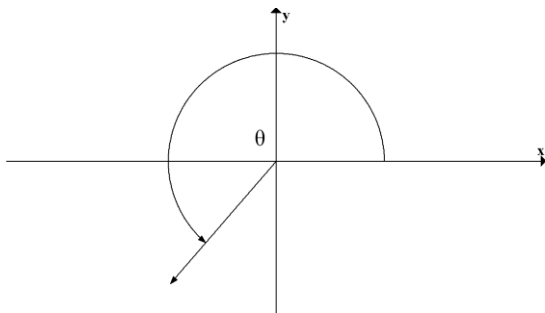
Video 5.5.1

26. \$36,000

Video 5.5.2

Trigonometry

27.



Videos 6.6.1 – 6.6.3

28. $\cos(\theta) = -\frac{1}{\sqrt{5}}$

Video 6.2.3

$$\sin(\theta) = \frac{2}{\sqrt{5}}$$

$$\tan(\theta) = -2$$

29. (a) $\cos(90^\circ) = 0$ Video 6.2.4
(b) $\sin\left(\frac{\pi}{2}\right) = 1$
(c) $\sec(\pi) = -1$
30. (a) $10 \tan(40^\circ) \approx 8.4$ m. Video 6.3.2
(b) Distance = $10 \tan(\theta)$
31. (a) Quadrant III Video 6.5.1
(b) $\sin(\theta) = -\frac{2}{\sqrt{5}}$ and $\cos(\theta) = -\frac{1}{\sqrt{5}}$.
32. $\sin(x)\cos(x)$ Video 6.5.2
33. The graph of $y = \sin(x)$ is stretched vertically by a factor of 3 and compressed horizontally by a factor of 4 to give the graph of $y = 3\sin(4x)$. Video 6.6.3
34. $x = \frac{\pi}{6}$ or $x = \frac{5\pi}{6}$ Video 7.6.1