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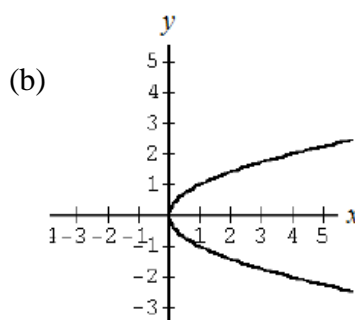
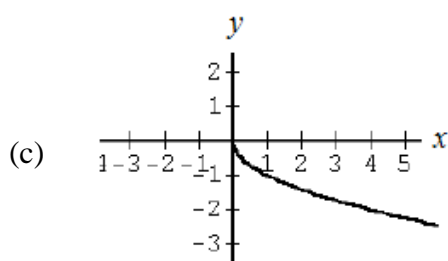
Course End Review

Functions and Relations

Introduction to Functions:

1. Given: $f(x) = 2x + 15$ and $g(x) = 3x^2 - 2x + 1$
- (a) Determine $f(-2) + g(1) - f(0)$
- (b) Determine $g[f(x)]$

2. State the domain and range:
- (a) $H(x) = 2(x - 5)^2 - 3$



3. A relation f is $f(x) = 2x^2 - 6x$, evaluate $f(-2)$.

4. Determine the inverse to the function $f(x) = 4x - 2$?

5. Find the inverse functions for:

(a) $f(x) = \frac{x+3}{2}$ (b) $g(x) = 4(x-3)^2 + 1$

6. Given $f(x) = -2(x+5)^2 + 3$, what is $f^{-1}(1)$?

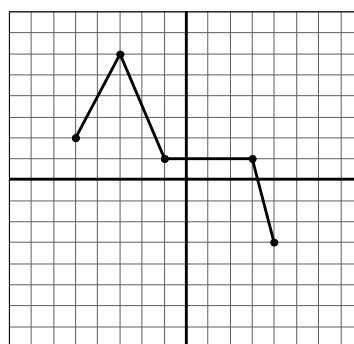
7. What transformations that are used to graph the function:

(a) $g(x) = -5\sqrt{4(x-2)} + 7$.

(b) $y = \frac{1}{3}f\left[-\frac{2}{5}(x+4)\right] - 6$

8. The function $f(x)$ is shown in the following graph:

- (a) State the domain
- (b) State the range
- (c) Determine the value of $f(3)$.
- (d) Determine the value(s) of $f^{-1}(1)$.



9. Determine the equation of a parabola with a vertex of $(3, -5)$ and goes through the point $(-4, 10)$.

Quadratic and Rational Expressions:

10. When a ball is tossed into the air, the height, h , in meters, of the ball after t seconds is modelled by, $h = 30t - 5t^2$, where h is the height of the ball in meters and t is the time in the air in seconds.

- (a) What is the ball's maximum height.
- (b) How long does it take to complete its full flight path?

11. Solve $(2x - 5)(2x - 5) = 0$ (leave in fraction form).

12. Solve for $-4(x + 3)^2 + 7 = 0$ (two decimal places).

13. Simplify: (a) $\frac{3x+1}{x^2+3x+2} - \frac{4x}{x^2+5x+6} + \frac{5x-3}{x^2+4x+3}$
- (b) $\frac{x^2-3x-4}{x^2+5x+6} \times \frac{x^2-4}{x^2-2x-3} \div \frac{x^2-4x}{(x+3)^2}$
14. Simplify and state **all** the restrictions: $\frac{m^2-4m-5}{5m^2-25m} \times \frac{15m^2}{m^2+3m+2} \div \frac{m^2-16}{m^2+8m+16}$
15. A triangle has base $\sqrt{6}$ and height $(3-\sqrt{24})$. What is the area of the triangle?
16. Simplify the expression: $6^{-5} \times \frac{6^3}{(6^4)^{-8}}$.
17. Simplify fully, $\frac{2x+1}{6x^2+x-2} - \frac{2x}{8x^2-4x}$.
18. Express the function in vertex form by completing the square: $f(x) = x^2 - 6x + 7$.

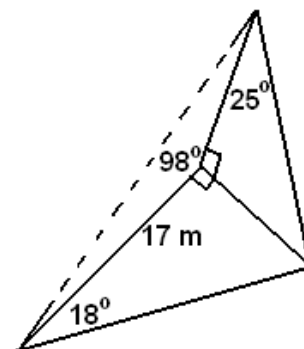
Exponential Functions:

19. Evaluate: (a) $8^{\frac{2}{3}} - 81^{\frac{3}{4}} + 4^2$
- (b) $16^{\frac{3}{4}} - 49^{\frac{1}{2}}$
20. Solve $9^{3x+7} = 27^{x-5}$
21. Simplify:
(a) $\sqrt{12}$ (b) $2\sqrt{75} - 5\sqrt{108}$
22. Evaluate $\left(\frac{27}{729}\right)^{\frac{2}{3}}$ (leave as fraction, no decimals).
23. Simplify: $\sqrt{\sqrt{256m^8}}$.

Trigonometric Functions:

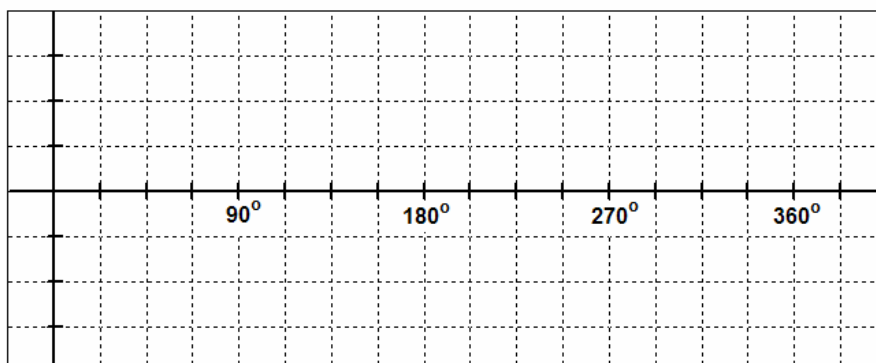
24. Solve:
(a) $2\cos^2\theta + 3\cos\theta - 2 = 0$ for $0^\circ \leq \theta \leq 360^\circ$.
(b) $6\sin^2x - \sin x - 1 = 0$, $0^\circ \leq \theta \leq 360^\circ$.
25. Prove:
(a) $\tan x + \frac{1}{\tan x} = \frac{1}{\sin x \cos x}$
(b) $\frac{\sin^2 x}{1 - \cos x} = 1 + \cos x$
(c) $\frac{\cos x \sin x}{1 - \cos^2 x} = \frac{1}{\tan x}$
26. Determine any value for x , such that $\cos 60^\circ = \sin x$

27. Convert $\sin 210^\circ$ to an **exact** trigonometric value.
28. Convert $\cos 315^\circ$ to an **exact** trigonometric value.
29. Determine the value of θ to the nearest degree if $\csc \theta = 1.75$.
30. Determine the value of θ to the nearest degree if $\cot \theta = 0.89$.
31. Solve the trigonometric equations (answer: nearest degree):
- $2 \sin \theta \cos \theta + \sin \theta = 0$, where: $0^\circ \leq \theta \leq 360^\circ$
 - $\sqrt{2} \sec x - 3 = 0$, where: $0^\circ \leq \theta \leq 360^\circ$
 - $6 \tan x + 2 = 3 \tan x$ for $0^\circ \leq x \leq 360^\circ$.
 - $4 \cos x + 3 = 5$, where: $0^\circ \leq \theta \leq 360^\circ$

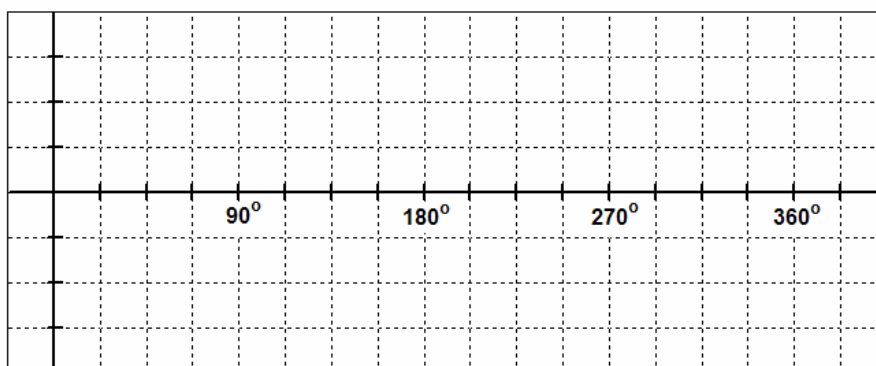


32. Find the length of the dashed line. (Nearest whole number)
33. For the given function: $y = -2 \sin(3\theta + 120^\circ) + 6$ for $0^\circ \leq \theta \leq 270^\circ$, state the following:
- amplitude
 - period
 - phase shift
 - vertical shift
 - domain
 - range

34. Sketch $y = -2 \cos(4x) + 1$ for one complete cycle ($0^\circ \leq x \leq 360^\circ$)



35. Sketch $y = 3 \sin\left(\frac{1}{2}x\right) - 1$ for one complete cycle ($0^\circ \leq x \leq 360^\circ$)



Discrete Functions:

36. Consider the arithmetic series $4 + 9 + 14 + \dots + 199$
- Calculate the number of terms in the series.
 - Calculate the sum of the series.
37. In an arithmetic series of 28 terms, the 7th term is 41 and the 18th term is 96.
- Find the sum of the series.
 - Find the first three terms
38. Given the series: $2 - 4 + 8 - \dots + 512$.
- Calculate the number of terms in the series.
 - Calculate the sum of the series.