PC11 Core Review Solutions
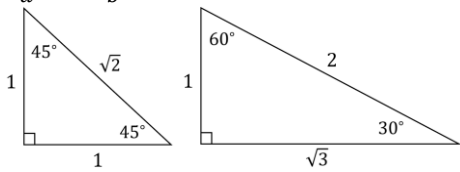
$y = a(x \pm b)^2 \pm c. \ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}. \ x = -\frac{b}{2a}$

$\frac{\sin A}{a} = \frac{\sin B}{b}. \ c^2 = a^2 + b^2 - 2ab \cos C.$

1. Is $\sqrt{49}$ rational or irrational?
    $\frac{7}{1}$ (rational)

2. Evaluate $\left(5x^3\right)^2$
    $25x^6$

3. Evaluate 2^{-4}
    $\frac{1}{2^4} = \frac{1}{16}$

4. Evaluate $9^{\frac{1}{2}}$
    $\sqrt{9} = 3$

5. Evaluate $1^{-\frac{3}{2}}$
    1

6. Simplify $\sqrt{5} \times \sqrt{7}$
    $\sqrt{35}$

7. Expand and simplify $\left(\sqrt{2} - 2\right)^2$
    $2 - 4\sqrt{2} + 4 = 6 - 4\sqrt{2}$

8. Order from least to greatest:
    $7, 2\sqrt{7}, -5, \frac{7}{2}, \sqrt{50}$
    $\sqrt{49}, \sqrt{28}, -5, 3.5, \sqrt{50}$
    $-5, \frac{7}{2}, 2\sqrt{7}, 7, \sqrt{50}$

9. Simplify $6\sqrt{27} \div \left(2\sqrt{3}\right) - \sqrt{3}$
    $\frac{18\sqrt{3}}{2\sqrt{3}} - \sqrt{3}$
    $9 - \sqrt{3}$

10. Solve $\sqrt{x + 1} = 3$
    $x + 1 = 9$
    $x = 8$

11. $\sqrt{x-4} = 6 - x$
    a. What is the x-value of the extraneous root?
        $x - 4 = (6 - x)^2$
        $x - 4 = 36 - 12x + x^2$
        $0 = x^2 - 13x + 40$
        $0 = (x - 5)(x - 8)$
        $x = 5$ (reject $x = 8$)

    b. What is the y-value of the extraneous root?
        1

12. What is the GCF of $27x^9y^2$ and $9x^5y^6$?
    $3x^5y^2$

13. Factor $x^2 + 3x - 28$
    $(x + 7)(x - 4)$

14. Factor $w^2 - 64$
    $(w + 8)(w - 8)$

15. Factor $9a^2 - 16b^2$
    $(3a + 4b)(3a - 4b)$

16. Simplify $\frac{x-3}{2x^2-5x-3} \div \frac{3}{2x+1}$
    $\frac{(x-3)}{(2x+1)(x-3)} \times \frac{(2x+1)}{3} = \frac{1}{3}$

17. Write as a single term $\frac{x-3}{4} - \frac{2x+1}{3}$
    $\frac{3(x-3)}{4(3)} - \frac{4(2x+1)}{3(4)}$
    $\frac{3x-9-8x-4}{12} = \frac{-5x-13}{12}$

18. $y = \frac{x+1}{x^2-4}$. What are the non-permissible values?
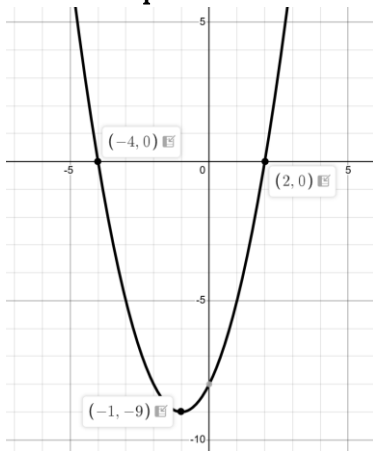 $y = \frac{x+1}{(x+2)(x-2)}$
    $x = \pm 2$

19. $y = (x + 1)^2 - 9$
    a. (x, y) coordinates of the vertex?
        $(-1, -9)$

b. Sketch the parabola.

Points labeled: $(-4, 0)$, $(2, 0)$, $(-1, -9)$

c. Domain?
   $x \in \mathbb{R}$
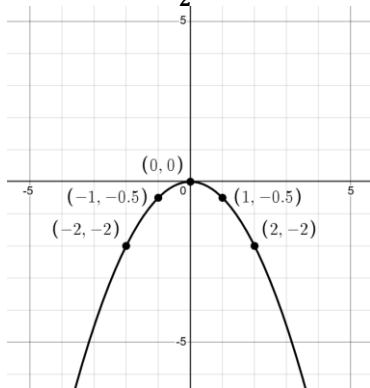
d. Range?
   $y \geq -9$

e. Equation of the line of symmetry?
   $x = -1$

f. Find the y-intercept
   $y = -8$

g. Find the x-intercepts
   $-4, 2$

20. Sketch $y = -\frac{1}{2}x^2$ and label 3 points.

Points labeled: $(0, 0)$, $(-1, -0.5)$, $(1, -0.5)$, $(-2, -2)$, $(2, -2)$

21. $y = x^2 + 2x - 8$

   a. Complete the square on this quadratic.
      $y = (x + 1)^2 - 1 - 8$
      $y = (x + 1)^2 - 9$

   b. Find the exact value of the x-intercepts.
      $x = -4, 2$

22. You own a rectangular plot of land. You have a total of 60 feet of fence. What x and y dimensions should you choose in order to maximize area?

$A = xy$ [1]

$60 = 2x + 2y$ [2]

$30 = x + y$

$30 - x = y$ (now substitute into [1])

$A = x(30 - x) = -x^2 + 30x$

$A = -(x - 15)^2 + 225$

$x = 15$

When $x = 15, y = 30 - x = 30 - 15 = 15$

23. Solve $3x - 2 > -5$

$3x > -3$

$x = -1$

24. Solve $x^2 < 25$

$-5 < x < 5$

25. Solve $x^2 - 10x + 21 \leq 0$

$(x - 3)(x - 7) \leq 0$

$-3 \leq x \leq 7$

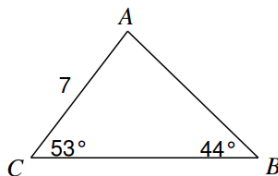26. Write $x \leq -3$ in interval notation using square or rounded brackets.

$(-\infty, -3]$

27. Write $-3 < x < \infty$ in interval notation using square or rounded brackets.
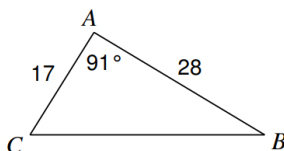
$x > -3$

28. Find AB in the triangle below:

2) Find AB

Let $AB = c$

$\dfrac{c}{\sin 53°} = \dfrac{7}{\sin 44°}$

$c \approx 8.05$

29. Find BC in the triangle below:

3) Find BC

Let $BC = a$

$a^2 = 17^2 + 28^2 - 2(17)(28) \cos 91°$

$a \approx 33.0$

30. Find the two possible values of $\angle B$ given
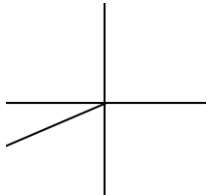$\angle A = 35°, a = 5$ and $b = 7$
$\frac{\sin B}{7} = \frac{\sin 35°}{5}$
$\sin B \approx 0.803$
$B_1 \approx 53.4°$
$B_2 \approx 126.6°$

31. $\theta = 210°$
   a. Sketch in standard position.

   b. Find the reference angle.
      $30°$

   c. Find a positive co-terminal angle.
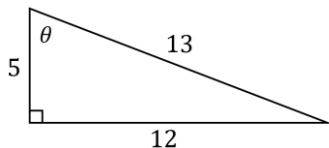 $390°$

32. Evaluate $\cos 60°$
   $\frac{1}{2}$

33. Evaluate $\tan 135°$
   -1

34. What is the equation of the unit circle?
   $x^2 + y^2 = 1$

35. Find $\cos \theta$ in the triangle below:

   $\cos \theta = \frac{5}{13}$

36. Solve $\sin A = -\frac{\sqrt{2}}{2}, 0 \le \theta \le 360°$
   $A_1 = 135°$
   $A_2 = 225°$

37. $A = P\left(1 + \frac{i}{n}\right)^{nt}$ is the compound interest formula. You invest \$5,000 in student loans. How much do you have in 10 years if the annual interest rate of 8% is compounded daily?
   Plug in the values only. No not evaluate the answer.
   $5000\left(1 + \frac{0.10}{365}\right)^{365(10)} \approx \$13,589.55$