

Take-Home Pre-Calculus Review*Due in class on Wednesday 22nd of August***1. Simplifying expressions:** Simplify each of the following

(a)

$$\frac{(2x^2)^{-3}}{(-x)^{-2}}$$

(b)

$$\frac{4}{x+3} - \frac{x}{x-3} - \frac{18}{x^2-9}$$

(c)

$$1 - \frac{3}{3 - \frac{1}{2y}}$$

2. Factoring expressions: Factor completely

(a)

$$6k^3 - 36k^4 + 48k^5$$

(b)

$$8p^2 - 18p^4$$

(c)

$$81 + 54a - 16a^2$$

3. Angles:(a) Find the **exact** radian measure of the angle 54° .(b) Find the **exact** degree measure of the angle $-\frac{5\pi}{2}$.

(c) Find the area of a sector of a circle of radius 6cm that has arc length 10cm.

4. Trigonometry:(a) If $\tan(-x) = 2$ and $\sin x < 0$, find $\sin x$ and $\cos x$.(b) If $\tan t = \frac{3}{4}$ and $\sec t < 0$, find $\sin t$ and $\cos t$.(c) Use the information from (a) and (b) to compute $\sin(x+t)$.(d) Use the information from (a) and (b) to compute $\cos(x+t)$.(e) In what quadrant is the angle $x+t$?**5. Solving equations:** Find all solutions to the following equations

(a)

$$1 + 3x^{-1} - 4x^{-2} = 0$$

(b)

$$\sqrt{4x+13} - 2x = -1$$

- (c) $|3 - x| - 3 = 7$
- (d) $\sin \theta + 2 \cos^2 \theta = 1$
- (e) $2 - \cos^2 2\theta = 4 \sin^2 \theta$

6. **Functions:**

- (a) An input-output machine accepts any real number as input, and always outputs the number 10, does this relation define a function? Justify your answer.
- (b) Find the domain of the function $f(x) = \sqrt{(x - 2)(x - 6)}$
- (c) Let $f(x) = \sqrt{x - 15}$ and $g(x) = x^2 + 2x$.
- Find $g \circ f(x)$ and the domain of $g \circ f(x)$.
 - Find $f \circ g(x)$ and the domain of $f \circ g(x)$.

7. **Graphing:** Graph the following, indicate any vertices or intercepts.

- (a)
$$y = -\frac{1}{x + 2}$$
- (b)
$$y = \sqrt{x - 1} + 2$$
- (c)
$$y = 2x^2 - 4x + 5$$
- (d)
$$x^2 + y^2 + 2x + 6y = 15$$
- (e)
$$y = 2 \cos(\pi(x - 1))$$

8. **Word problem:** The height, in feet, of a projectile t seconds after being fired from earth into the air is given by $s(t) = -16t^2 + 160t$.
- Find the number of seconds required for the projectile to reach to reach its maximum height.
 - What is the maximum height?
9. **Another word problem:** Two runners start running laps at the same time from the same starting position. George takes 50 seconds to run a lap while Sue takes 30 seconds (they both run at constant speeds). When will the runners next be even with each other?
10. **Cockroach problem:** My kitchen floor consists of 25 tiles in a 5×5 arrangement. When I come home there is exactly one cockroach occupying each tile. These are special cockroaches - When I flash my light on and off each roach jumps to one of the immediately adjacent tiles (they cannot jump diagonally). Is it possible that after performing this trick there is still exactly one cockroach on each tile? How convincing can you make your answer?