

Review Problems

- A used car went on a 20% sale. The sale price is \$5760. Find the original price for the car.
- This morning the sample contained 26 928 000 bacteria. How many were there last night if the sample
 - grew 2% overnight?
 - grew 20% overnight?
 - grew 120% overnight?
- Express each of the following in terms of $\sin \alpha$ or $\cos \alpha$.
 - $\cos(-\alpha)$
 - $\cos(\alpha + 90^\circ)$
 - $\cos(180^\circ - \alpha)$
- Which of the following is equal to $\sin \alpha$? There may be more than one correct answer.
 - $\sin(\alpha + 180^\circ)$
 - $\sin(-\alpha)$
 - $\cos(\alpha - 90^\circ)$
 - $\sin(180^\circ - \alpha)$
- Compute the exact value of $\cos 1^\circ + \cos 2^\circ + \cos 3^\circ + \dots + \cos 179^\circ + \cos 180^\circ$
- Simplify each of the following expressions.
 - $\log_6 1 + \log_6 2 + \log_6 3$
 - $\log_3(x^2 - 1) - \log_3(x - 1)$
 - $\log_6(12a^3) + \log_6(3a^5)$
 - $\frac{1}{2} \ln(10^{10})$
 - $\log_2(\log_2(x^{32}))$
 - $2 \log_5 \sqrt{a}$
- Suppose that $\log_3 2 = x$. Express each of the following in terms of x .
 - $\log_3 6$
 - $\log_3 24$
 - $\log_2 3$
 - $\log_6 48$
- Solve each of the following equations.
 - $1 - \cos x = 2 \sin^2 x$
 - $\tan^2 x = \tan x$
 - $-2 = \cos^2 x + 2 \sin x$
 - $\sqrt{3x - 2} + \sqrt{x - 1} = 3$
 - $\log_3(x - 4) = -2$
 - $\ln(x^2 - 1) = -1$
 - $\log_6(x + 1) + \log_6 2 + \log_6(x - 2) = 2$
 - $\log_2(1 - x) + \log_2(5 - x) = 5$
 - $\log_5(x - 9) - \log_5(x - 17) = -1$
- Find the domain of each of the following functions.
 - $f(x) = \frac{1}{\log_2(x - 10)}$
 - $g(x) = \frac{1}{\sin x - \sqrt{3} \cos x}$
 - $m(x) = \ln(x^2 - 9)$
 - $p(x) = \ln(x + 3) + \ln(x - 3)$
 - $f(x) = \log_9\left(\frac{x + 2}{x - 5}\right)$
 - $f(x) = \csc x$
- Graph each of the following functions. In each case, describe what basic functions and transformations you would use to graph the function.
 - $f(x) = \frac{2}{x - 4} + 1$
 - $f(x) = -2\sqrt{x + 1}$
 - $f(x) = \frac{1}{3} \log_2(x + 2) - 1$

Answers

1. \$7200
2. a) 26 400 000 b) 22 440 000 c) 12 240 000
3. a) $\cos(-\alpha) = \cos \alpha$ b) $\cos(\alpha + 90^\circ) = \cos(90^\circ - (-\alpha)) = \sin(-\alpha) = -\sin \alpha$
 c) $\cos(180^\circ - \alpha) = -\cos \alpha$
4. C and D
5. -1
6. a) 1 b) $\log_3(x+1)$ c) $2 + 8 \log_6 a$ d) $5 \ln 10$ e) $5 + \log_2(\log_2 x)$ f) $\log_5 a$
7. a) $x+1$ b) $3x+1$ c) $\frac{1}{x}$ d) $\frac{4x+1}{x+1}$
8. a) $x = \pm \frac{2\pi}{3} + 2k\pi$, $x = 2k\pi$, where $k \in \mathbb{Z}$ b) $x = \frac{\pi}{4} + k\pi$, $x = k\pi$, where $k \in \mathbb{Z}$
 c) $x = -\frac{\pi}{2} + 2k\pi$ where $k \in \mathbb{Z}$ d) 2 e) $\frac{37}{9}$ f) $\pm \sqrt{\frac{1}{e} + 1}$ g) 5 h) -3
 i) no solution
9. a) $x > 10$ but $x \neq 11$ b) $x \neq \frac{\pi}{3} + k\pi$ where $k \in \mathbb{Z}$ c) $x < -3$ or $x > 3$ d) $x > 3$
 e) $x < -2$ or $x > 5$ f) $x \neq k\pi$ where $k \in \mathbb{Z}$
10. a) $f(x) = \frac{2}{x-4} + 1$ b) $f(x) = -2\sqrt{x+1}$ c) $f(x) = \frac{1}{3} \log_2(x+2) - 1$
 start with $y = \frac{1}{x}$ start with $y = \sqrt{x}$ start with $y = \log_3 x$
 shift to the right by 4 units shift to the left by 1 unit shift to the left by 2 units
 stretch by 2 along the y -axis reflect to x -axis stretch by $\frac{1}{3}$
 shift up by 1 unit stretch along the y -axis by 2 shift down by 1 unit

