

1. (6 pts) Fill in the exact values:

$$\cos\left(\frac{\pi}{4}\right) =$$

$$\sin\left(\frac{7\pi}{2}\right) =$$

$$\sin^{-1}\left(\frac{\sqrt{3}}{2}\right) =$$

$$\left(\frac{4}{9}\right)^{-1/2} =$$

$$\log_2 32 =$$

$$\log_{10}(0.001) =$$

2. (4 pts) Circle the correct answer (assume that $x \neq 0$):

(a) The expression $\frac{2x^2}{x^4 + 2x^2}$ is equivalent with:

(i) $\frac{1}{x^4 + 1}$

(ii) $\frac{2}{x^2} + 1$

(iii) $\frac{2}{x^2 + 2}$

(iv) $\frac{1}{x^2 + 1}$

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

(b) The expression $\frac{x^2}{\sqrt[3]{x^2}}$ is equivalent with:

(i) \sqrt{x}

(ii) 1

(iii) $x\sqrt[3]{x}$

(iv) $x^{-1/3}$

(v) none of the above

3. (4 pts) Find the domain of each of the following functions. Write your answer in interval form.

(a) $f(x) = \sqrt{x+1} - \sqrt{6-2x}$

(b) $g(x) = \frac{x}{x^2 + x - 6}$

4. (6 pts) Sketch the graph of each of the following functions and mark the coordinates of axis intercepts.

(a) $f(x) = 2x - x^2$

(b) $g(x) = \begin{cases} 2x + 3 & \text{if } x \leq 0 \\ \sqrt{x} & \text{if } x > 0 \end{cases}$

5. (4 pts) True or False? Assume x, y are positive real numbers. Circle "True" if the equality holds for all x, y . Otherwise, circle "False".

$$\sqrt{x^2 + y^2} = x + y \quad \text{True} \quad \text{False}$$

$$(x + y)^{-1} = x^{-1} + y^{-1} \quad \text{True} \quad \text{False}$$

$$\log(x^2 + y^2) = 2 \log x + 2 \log y \quad \text{True} \quad \text{False}$$

$$\sin\left(\frac{\pi}{2} - x - y\right) = \cos(x + y) \quad \text{True} \quad \text{False}$$

6. (3 pts) Sketch the graph of $y = 2 \cos(3x)$ and label the coordinates of at least two of the maximum points (that is, points where y is maximum).

7. (3 pts) Write an equation of the line that contains the points $(-2, -13)$ and $(1, 2)$.

8. (6 pts) Compute and simplify the following expressions:

(a) $\frac{f(3+h) - f(3)}{h}$ if $f(x) = 2x - x^2$

(b) $\frac{g(x) - g(a)}{x - a}$ if $g(x) = \frac{2}{1+x}$

9. (8 pts) Find all real solutions of the following equations (2 pts each):

(a) $x^4 - 5x^2 + 4 = 0$

(b) $3 \cdot (5^{2x}) = 7$

Leave your answer as a logarithm for this one.

(c) $\sin^2 x = \cos^2 x$

OK to find all solutions $x \in [0, 2\pi]$ for this one.

(d) $ax^2 + bx + c = 0$

I want to check you know the quadratic formula.

10. (6 pts) For a 16:9 TV, the ratio (width of screen)/(height of screen) is 16/9.

(a) For a 16:9 TV, find a function expressing the area of the screen, A , in terms of its diagonal length d .

(b) For a 16:9 TV, what is the angle that the diagonal is making with the horizontal? Leave your answer as an inverse trigonometric function.