Math 172 Prerequisite Worksheet Name: _____

Due: 19 Jan. 2016 **Show Appropriate Work, Justify Answers**

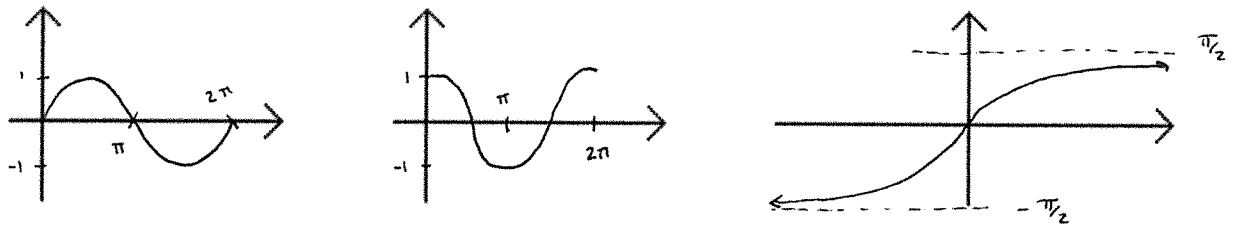
1. (2 pts) Solve for x: $\frac{8}{x} - 2 = x$ so $8 - 2x = x^2$ or $x^2 + 2x - 8 = 0$

$(x+4)(x-2) = 0$

$x = -4$ or $x = 2$

2. (6 pts) Sketch a graph for each. Clearly label the scale on the axes and provide appropriate points.

(a) $y = \sin x$ (b) $y = \cos x$ (c) $y = \arctan x$



3. (4 pts) Evaluate exactly - no calculators.

(a) $\cos(-\pi/3)$ (b) $\sin(2\pi/3)$ (c) $\tan(3\pi/4)$ (d) $\arctan(1)$

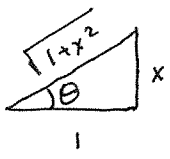
$\frac{1}{2}$ $\frac{\sqrt{3}}{2}$ -1 $\frac{\pi}{4}$

4. (4 pts) Use an appropriate triangle to simplify. [Hint: $\sin 2\theta = 2\sin\theta\cos\theta$]

$\sin(2\arctan x)$

Let $\theta = \arctan x$

so $\tan\theta = \frac{x}{1}$



$\sin(2\theta) = 2\sin\theta\cos\theta$

$= 2\left(\frac{x}{\sqrt{1+x^2}}\right)\left(\frac{1}{\sqrt{1+x^2}}\right)$

$= \frac{2x}{1+x^2}$

5. (6 pts) Differentiate.

(a) $f(x) = x^{2/3}\ln x$

$f'(x) = \frac{2}{3}x^{-1/3}\ln x + x^{2/3}\cdot\frac{1}{x}$

$= x^{-1/3}\left(\frac{2}{3}\ln x + 1\right)$

(b) $g(y) = \arctan(2y+6)$

$g'(y) = \frac{2}{1+(2y+6)^2}$

6. (12 pts) Evaluate.

(a) $\lim_{x\to\infty} \frac{\ln x}{\sqrt{x}} \overset{L'H}{=} \lim_{x\to\infty} \frac{1/x}{1/2\sqrt{x}} = \lim_{x\to\infty} \frac{2\sqrt{x}}{x} = \lim_{x\to\infty} \frac{2}{\sqrt{x}} = 0$

(b) $\int \frac{\sqrt{x}-1}{x}\,dx = \int \left(x^{-1/2} - \frac{1}{x}\right) dx = 2x^{1/2} - \ln x + C$

$= 2\sqrt{x} - \ln x + C$

(c) $\int_{\pi/6}^{\pi/4} \cos(2x)\,dx = \frac{1}{2}\int_{\pi/3}^{\pi/2} \cos u\,du = \frac{1}{2}\sin u \Big|_{\pi/3}^{\pi/2}$

$u = 2x$, $du = 2\,dx$

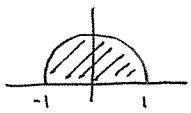
x	u
$\frac{\pi}{4}$	$\frac{\pi}{2}$
$\frac{\pi}{6}$	$\frac{\pi}{3}$

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

7. (2 pts) Evaluate the integral by interpreting it as an area. Provide justification.

[Hint: consider $x^2 + y^2 = 1$]

$\int_{-1}^{1} \sqrt{1-x^2}\,dx = \frac{\pi}{2}$



8. (2 pts) Answer the following questions using the main course webpage:

(a) What are the dates of the three common hour exams? 2/10 // 3/9 // 4/12

(b) When is the final exam (date and time)? May 6 10-11:50

9. (2 pts) During the semester, optional supplementary help sessions will be available for students who are struggling with the material. Please circle all the times which you would be available to attend if you needed to. You may also select "no interest" if you would not attend.

Wednesdays: 9am 10am 1pm 2pm 3pm | Thursdays: 1pm 2pm 3 pm 4pm | NO INTEREST