Math 172 | Quiz 1 | Name: ________________
22 Jan 2016 | Show Appropriate Work | Point Values in $\boxed{\text{boxes}}$.

1. Integrate.

(a) $\boxed{2}$ $\displaystyle\int \frac{\sin(\sqrt{t})}{\sqrt{t}}\,dt = 2\int \sin u\,du = -2\cos u + C$

Let $u = \sqrt{t}$ $\qquad\qquad = -2\cos\sqrt{t} + C$

$du = \dfrac{1}{2\sqrt{t}}\,dt$

(b) $\boxed{3}$ $\displaystyle\int_0^2 \frac{x}{x^2+4}\,dx = \frac{1}{2}\int_4^8 \frac{du}{u} = \frac{1}{2}\ln|u|\Big|_4^8 = \frac{1}{2}(\ln 8 - \ln 4)$

Let $u = x^2+4$ $\qquad = \frac{1}{2}\ln 2$

$du = 2x\,dx$ $\qquad = \ln\sqrt{2}$

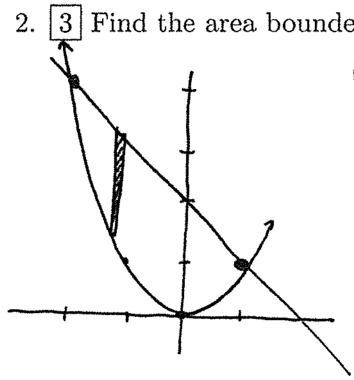
x	$\longmapsto$	u
0		4
2		8

(c) $\boxed{2}$ $\displaystyle\int \frac{1}{x^2+4}\,dx = \frac{1}{4}\int \frac{dx}{\left(\frac{x}{2}\right)^2+1} = \frac{1}{2}\int \frac{du}{u^2+1} = \frac{1}{2}\arctan\left(\frac{x}{2}\right) + C$

let $u = \dfrac{x}{2}$

$du = \frac{1}{2}dx$

2. $\boxed{3}$ Find the area bounded by $y = x^2$ and $y = 2 - x$.



intersect when $x^2 = 2 - x$

$x^2 + x - 2 = 0$

$(x+2)(x-1) = 0$

$x = -2$, $x = 1$

$$V = \int_{-2}^{1} (2 - x - x^2)\,dx = 2x - \frac{x^2}{2} - \frac{x^3}{3}\Big|_{-2}^{1}$$

$$= \left(2 - \frac{1}{2} - \frac{1}{3}\right) - \left(-4 - \frac{4}{2} + \frac{8}{3}\right)$$

$$= \frac{12}{6} - \frac{3}{6} - \frac{2}{6} + \frac{24}{6} + \frac{12}{6} - \frac{16}{6} = \frac{27}{6} = \frac{9}{2}$$