2 Pages! **Quiz 2A**, Math 1850 Section 011
9/11/2014 Solutions Name ______________

(3) 1. If $f(x) = 1/x^2$, $x > 0$ then find a formula for $f^{-1}(x)$.

We solve $y = 1/x^2$ and solve for x:$x^2 = 1/y$ and so $x = \pm\sqrt{1/y}$ but $x > 0$ and so $x = 1/\sqrt{y}$. interchange x and y: $y = 1/\sqrt{x}$. Therefore $f^{-1}(x) = 1/\sqrt{x}$

(6) 2. Simplify the expression.

(a) $e^{\ln x - \ln y}$

$$e^{\ln x - \ln y} = \frac{e^{\ln x}}{e^{\ln y}} = \frac{x}{y}$$

(b) $\sin^{-1}\left(\frac{-\sqrt{3}}{2}\right)$ (Give an exact result; do not use a calculator)

We need the value of θ, $-\pi/2 \leq \theta \leq \pi/2$ so that $\sin\theta = -\sqrt{3}/2$. Therefore $\theta = -\pi/3$:

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

(3)

3. Solve for y in terms of x.

$$\ln(y-1) - \ln 2 = x + \ln x$$

Exponentiate both sides.

$$\begin{aligned} e^{\ln(y-1) - \ln 2} &= e^{x + \ln x} \\ \frac{e^{\ln(y-1)}}{e^{\ln 2}} &= e^x e^{\ln x} \\ \frac{y-1}{2} &= xe^x \end{aligned}$$

so that $y = 1 + 2xe^x$.

(8) 4. For the curve $y = x^2 - 2x - 3$, find

(a) the slope at $P(2, -3)$.

To find the slope at P we find the slope of the secant lines through $P(2, -3)$ and through $Q(2+h, (2+h)^2 - 2(2+h) - 3)$. The slope is the rise/run:

$$\begin{aligned} \frac{(2+h)^2 - 2(2+h) - 3 - (-3)}{2+h-2} &= \frac{(2+h)^2 - 2(2+h)}{h} \\ &= \frac{4 + 4h + h^2 - 4 - 2h}{h} = \frac{h(2+h)}{h} = 2 + h \end{aligned}$$

As h gets smaller the secant lines approach the tangent line and so the slope must be $\lim_{h\to 0} 2 + h = 2$. Therefore the slope of the tangent line is 2.

(b) an equation of the tangent line at $P(2, -3)$.

An equation of the tangent line is that of the line through $P(2, -3)$ and of slope 2: $y - (-3) = 2(x - 2)$ or $y = 2x - 7$.