Fall 2008- Math 1290 – Quiz 1 $\bar{x} = 8.5$ Name: Key

1. If $f(x) = 3x - 2$ *and* $g(x) = \sqrt{x^4 + 3x}$, find $g(f(x))$ and evaluate $g(f(1))$.

2 $g(f(x)) = g(3x-2) = \sqrt{(3x-2)^4 + 3(3x-2)}$

$g(f(1)) = \sqrt{3(1-2)^4 + 3(3(1)-2)}$

$= \sqrt{(1)^4 + 3(1)} = \sqrt{4} = \boxed{2}$

2. Find the inverse of the function $f(x) = \sqrt{2x - 4}$ and find the domain and range of the inverse.

2 $y = \sqrt{2x-4}$ $2x-4 \geq 0$ $D_f: [2, \infty) = R_{f^{-1}}$

$y^2 = 2x - 4$ $2x \geq 4$

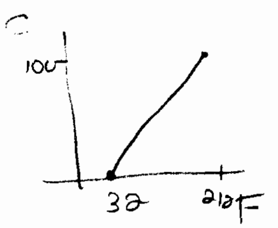
$x \geq 2$ $R_f = [0, \infty) = D_{f^{-1}}$

$\frac{y^2+4}{2} = x$

$f^{-1}(x) = \frac{x^2+4}{2}$

3. In 1953 Ray Bradbury published the book *Fahrenheit 451*. The title of the book is the temperature at which paper ignites. If you know that $0^\circ C = 32^\circ F$ *and* $100^\circ C = 212^\circ F$, find a linear relationship that relates the two temperature scales and determine the temperature in Celsius that paper ignites.

3



$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{100-0}{212-32} = \frac{5}{9} \approx 0.\overline{5}$

$y = mx + b$

$y = \frac{5}{9}x + b$

$0 = \frac{5}{9}(32) + b$

$b = -\frac{160}{9} \approx 17.\overline{7}$

$^\circ C = \frac{5}{9}{}^\circ F - \frac{160}{9}$

$^\circ C = \frac{5}{9}(451) - \frac{160}{9}$

$\boxed{^\circ C = 232.7}$

4. Since cells are primarily made of water the density of a spherical cell is roughly the density of water, $1\frac{g}{cm^3}$. error on quiz.

3

Compute the mass in kilograms of a cell with a radius of $2.7\ \mu m$. Recall: $1\text{m} = 10^6\ \mu m = 10^{2}$ cm and $V_{sphere} = \frac{4}{3}\pi r^3$

$r = 2.7\ \mu m \left| \frac{10^2\ cm}{10^6\ \mu m} \right. = 2.7 \times 10^{-4}\ cm$

$V = \frac{4}{3}\pi (2.7 \times 10^{-4})^3 = 8.24 \times 10^{-11}\ cm^3$

$m = \rho V = 1\frac{g}{cm^3} \cdot 8.24 \times 10^{-11}\ cm^3 = 8.24 \times 10^{-11}\ g \left| \frac{1\ kg}{1000\ g} \right. = \boxed{8.24 \times 10^{-14}\ kg}$

or

$V = \frac{4}{3}\pi (2.7\ \mu m)^3 = 82.4\ \mu m^3$

$82.4\ \mu m^3 \left| \frac{(1\ m)^3}{(10^6\ \mu m)^3} \right| \frac{(100\ cm)^3}{(1\ m)^3} = 8.24 \times 10^{-11}\ cm^3$

$m = \rho V = 1\frac{g}{cm^3}(8.24 \times 10^{-11}\ cm^3)$

$= 8.24 \times 10^{-11}\ g \left| \frac{1\ kg}{1000\ g} \right.$

$\boxed{8.24 \times 10^{-14}\ kg}$